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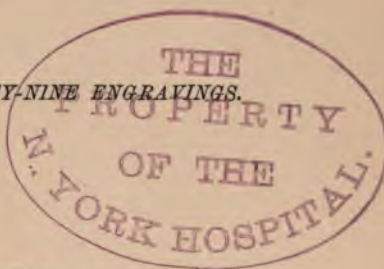
A
PRACTICAL TREATISE
ON
TUMORS OF THE MAMMARY GLAND:
EMBRACING THEIR
HISTOLOGY, PATHOLOGY, DIAGNOSIS, AND TREATMENT.

BY

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TO

SAMUEL D. GROSS, M.D., LL.D., D.C.L. Oxon.,
PROFESSOR OF SURGERY IN THE JEFFERSON MEDICAL COLLEGE,

THIS VOLUME,

DESIGNED TO RECONCILE THE CLINICAL FEATURES AND THE MINUTE

STRUCTURE OF TUMORS OF THE MAMMARY GLAND,

IS AFFECTIONATELY INSCRIBED

BY HIS SON,

THE AUTHOR.



P R E F A C E.

MODERN histological researches have so completely revolutionized our knowledge of the various new formations that, so far as I know, tumors of the mammary gland have not, up to the present time, constituted the subject of a systematic and strictly accurate treatise. To fill this void, I have studied their minute structure, investigated their general pathology, and applied the principles which are fairly deducible from their anatomy and their history to their differential diagnosis and to their rational treatment. As the deductions founded upon the older statistics are of little or no value, I have, with the view of harmonizing structural with clinical observations, examined the entire subject anew, and have carefully analyzed sixty-five cases of cysts and nine hundred and two neoplasms, the nature of which has been confirmed by the microscope, and more than one-seventh of which are original.

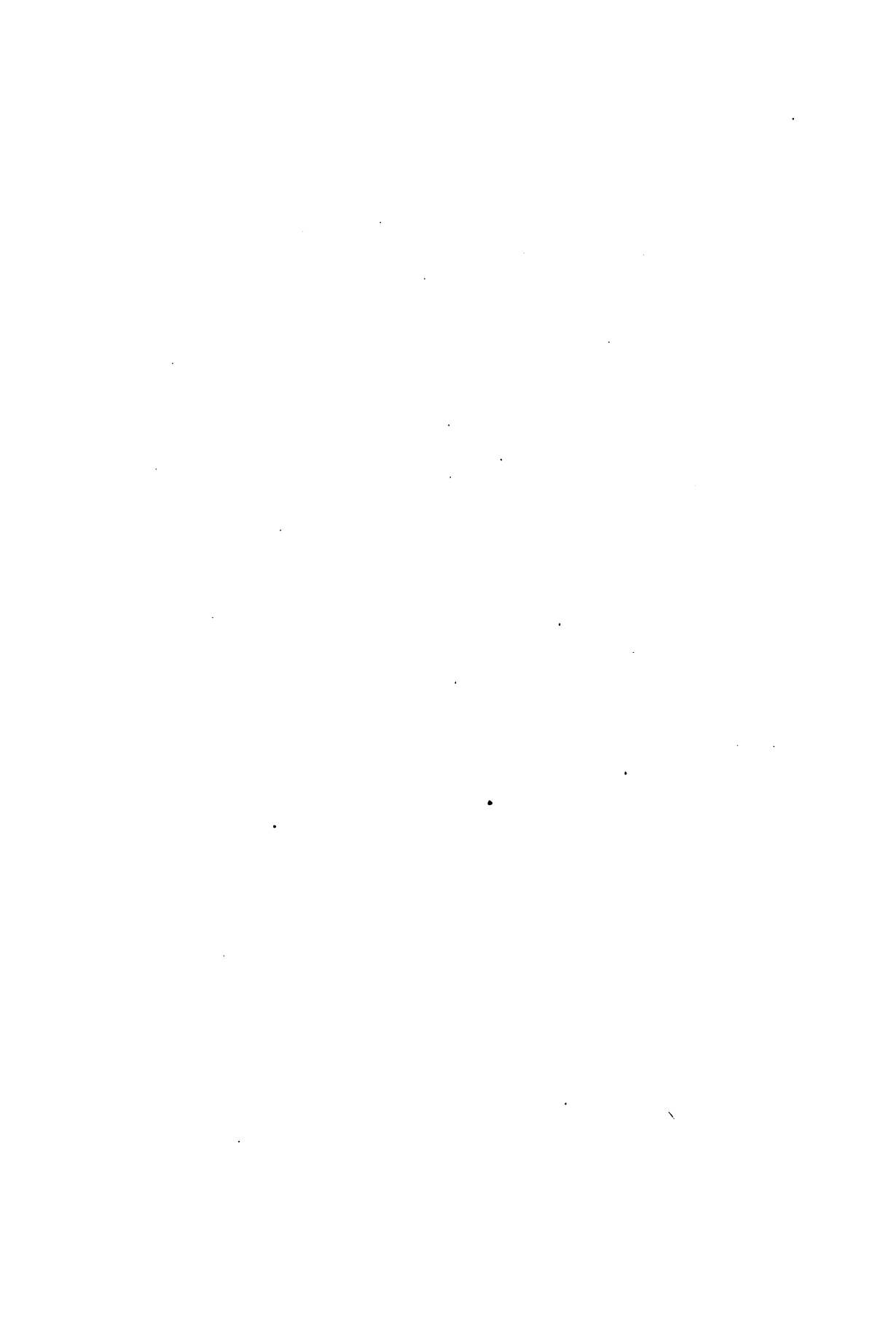
Not the least important part of the work is that in which the view is sought to be maintained by an abundant array of facts, that carcinoma may be permanently relieved by thorough operations practised in the early stage of its evolution. I am aware that this doctrine will not meet with general acceptance on the part of those purely mechanical surgeons who believe that freedom from recurrence denotes an innocent neoplasm. In every case of final recovery mentioned in this treatise, however, the diagnosis was based upon minute examinations conducted by trustworthy microscopists, whose reports have been utilized in this inquiry to the exclusion of the descriptions of the early writers on carcinoma.

To place the subject of tumors of the mammary gland in the clearest possible light, and to afford material assistance in their differentiation, I have interspersed through the text drawings of their minute features, made, with the aid of the camera, principally from my own specimens, so as to leave no doubt as to their true nature. For all of these drawings, with the exception of figs. 2 and 6, which are from the pencil of Assistant-surgeon W. B. Brewster, U. S. Army, and of fig. 10, which was kindly furnished me by Dr. W. B. Nancrede of this city, I am indebted to Dr. E. O. Shakespeare, one of the accomplished translators of Cornil and Ranvier's "Manual of Pathological Histology." For figs. 3,

4, and 25, taken from wet specimens, I have to express my obligations to Dr. S. E. James, formerly Resident Physician in the Jefferson Medical College Hospital. The remaining illustrations are from photographs of my private and public cases.

S. W. GROSS.

1112 WALNUT STREET, PHILADELPHIA, June, 1880.



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A PRACTICAL TREATISE
ON
TUMORS OF THE MAMMARY GLAND.

CHAPTER I.

*CLASSIFICATION AND RELATIVE FREQUENCY OF TUMORS OF
THE MAMMA.*

TUMORS of the mammary gland include neoplasms and cysts. The former are morbid additions to, or rather overgrowths of, the component tissues of the organ, and represent an excess of normal development and growth. They are products of the same formative laws as the healthy structures, and are subject to the same physiological laws, which not only preside over the evolution of the latter, but likewise regulate their renewal and their degenerations. Unlike the inflammatory new formations, they persist and increase; and they possess an individuality of their own, as is evinced by their growing irrespective of the gland itself, and, in certain instances, by reproducing their like in the contiguous and associated structures and in distant organs. Cysts, on the other hand, with the exception of those which surround hydatids, are not new forma-

tions, but result merely from ectasia or dilatation, and the retention of the secretion, of the lacteal glands and of their ducts.

Up to a comparatively recent period the non-carcinomatous neoplasms of the breast were universally described, and are still ranked in standard works on surgery, and, to a less extent, on pathological anatomy, or labeled in our museums, as adenoma, or under some of its various synonyms, as adenocoele, adenoid tumor, proliferous mammary cyst, mammary glandular tumor, or partial glandular hypertrophy or hyperplasia. These terms would naturally induce one not acquainted with modern histological research to conclude that tumors developed at the expense of the secreting structure were so excessively common as to constitute the majority of the so-called benign growths, when, in point of fact, under these names are included formations which differ widely in their genesis, intimate nature, and clinical features.

This confusion originated mainly with, and was perpetuated by, Mr. Birkett,¹ who, in confirming the previous observations of Lebert² on the presence of acini and ducts in mammary growths, taught that the former were of new formation, and consequently called the tumors, which were previously known as pancreatic sarcoma,³ chronic mammary tumor,⁴ fibro-cellular hypertrophy,⁵ and fibrous bodies,⁶ lobular imperfect hypertrophies, a term which he soon

¹ *The Diseases of the Breast*, p.124, 1850.

² *Physiologie Pathologique*, vol. ii, pp. 193-202, 1845.

³ Abernethy, *An Attempt to form a Classification of Tumors*, 1804.

⁴ Sir Astley Cooper, *Illustrations of the Diseases of the Breast*, p. 54, 1829.

⁵ Velpeau, *Dict. de Médecine*, t. xix, art. "Mamelle," 1839.

⁶ Cruveilhier, *Bull. de l'Acad. Roij. de Médecine*, t. ix, p. 330, 1844.

dropped for adenocele,¹ which, in its turn, was replaced by adenoma, to which he still adheres in his latest publications.² From the great importance which he attached to the discovery of acini in these neoplasms, through which they bear a certain resemblance to the structure of the normal mamma, the other constituents which enter into their composition were thought so lightly of that they were not considered in determining their nature; and to such an extent did his and Lebert's doctrines influence contemporaneous writers that, in describing mammary tumors for the most part as adenoid, we have been deprived of an immense mass of material which would otherwise have proved invaluable in an analytical study of the non-carcinomatous growths. Hence it is that, with few exceptions, I cannot avail myself of the one hundred and twenty-five cases of adenoma recorded and analyzed by Birkett,³ nor of the eighty-one examples of adenocele of Bryant,⁴ nor of the observations of Paget,⁵ Velpeau,⁶ and Broca.⁷

While it is true that hyperplasia of the glandular tissue of the breast may be so excessive as to constitute the tumor known as adenoma, this occurrence is so rare that true adenomata must be ranked among the most infrequent of neoplasms. In all of the connective tissue tumors the lacteal glands, although their epithelium may be in a state of irritation, generally

¹ *Guy's Hosp. Reps.*, ser. 3, vol. i, p. 131, 1855.

² *Holmes's System of Surgery*, 2d ed., vol. 5, p. 255, 1871.

³ *Ante.*

⁴ *The Practice of Surgery*, Phila., 1879, p. 685.

⁵ *Lectures on Surgical Pathology*, 2d ed., pp. 427 and 559.

⁶ *Traité des Maladies du Sein*, p. 416, 1854.

⁷ *Traité des Tumeurs*, t. ii, p. 413, 1869.

remain passive, and as the growth advances they may disappear to such an extent as to be scarcely, if at all, recognizable. Instead, therefore, of being newly formed and predominant, the secreting elements are really merely accessory or accidental, and represent the remains of old or preëxisting glands contained, but widely separated, in a fibromatous, sarcomatous, or myxomatous stroma. At the present day, therefore, we hear less of adenoma than formerly, an advance for which we are mainly indebted to Billroth,¹ Virchow,² Cornil and Ranvier,³ Monod,⁴ and Labbé and Coyne;⁵ although Billroth,⁶ Klebs,⁷ Duplay,⁸ Green,⁹ and Wilks and Moxon,¹⁰ and others prefix the term adeno to these tumors to indicate the persistence of more or less modified glandular tissue. From the fact, however, that nearly all the histoid mammary tumors are mixed, in the sense of their including glandular structure, and from the circumstance also that the recurrent growths are devoid of acini and ducts, if the entire breast has been removed, the term adeno is a misnomer, and should no more be applied to a tumor of the mamma than a sarcoma of a bone should be called an osteosarcoma, or a sarcoma of a muscle a myosarcoma.

¹ *Virchow's Archiv*, Bd. xviii, p. 51, 1860.

² *Die Krankhafte Geschwülste*, chapters on fibroma, myxoma, and sarcoma, 1864.

³ *Manuel d'Histologie Path.*, pp. 127, 151, 160, and 292, 1869.

⁴ *Arch. Gén. de Méd.*, ser. 6, t. xxv, p. 22, 1875.

⁵ *Traité des Tumeurs Bénignes du Sein*, 1876.

⁶ *Ante- and Chir. Klinik*, Wien, 1871-'76, pp. 261-263.

⁷ *Hdbch. der Path. Anat.*, Bd. i, Abth. 1, p. 1199, 1876.

⁸ *Traité Élément. de Path. Externe*, par Follin et Duplay, t. v, p. 615 *et seq.*, 1878.

⁹ *Pathology and Morbid Anatomy*, p. 140, Phila., 1876.

¹⁰ *Lectures on Path. Anatomy*, 2d ed., p. 583, 1875.

While Lebert, and Birkett, and their followers were wrong in regarding the glandular constituents as the essential elements of the non-carcinomatous neoplasms, their investigations were of great value in confirming, with the aid of the microscope, the view of Sir Astley Cooper, that there is a class of growths entirely distinct from carcinoma. Had they only paid the same amount of attention to the fibrous element of the breast as a source of the new formations as they did to connective tissue elsewhere, they would readily have understood why it is that among the so-called benign growths some are perfectly innocent, while others reproduce themselves locally after removal, and others give rise to metastatic deposits in distant organs.

Almost as much confusion exists among pure clinicians in regard to the epithelial formations. Medullary, colloid, and withering carcinoma are so constantly confounded with medullary sarcoma, myxoma, and contracting fibroma, and the converse, that it is impossible to find an accurate and complete account of these affections in any work with which I am acquainted. True adenoma, which has only recently emerged from the obscurity which surrounded it, is also in danger of being misunderstood in consequence of being described as epithelioma by several French writers.

In their anatomical construction many of the mammary tumors closely resemble the normal tissues. In some examples, as in fibroma, the likeness is almost perfect, while in others the disposition of their constituents, modified as they frequently are by certain transformations or combinations, is so unlike the normal anatomical construction that the similarity

amounts merely to a bad mimicry. In point of fact, they are physiologically and structurally atypical, in that the tissues of which they are composed perform no functions, and are arranged differently from the natural standard. A pure adenoma, for example, is made up of newly formed acini, but these are never aggregated into lobules attached to excretory ducts; while nothing could deviate more from the normal type than a carcinoma. Hence, in classifying the neoplasms of the mamma, instead of adhering to the modern custom of saying that they are formed upon the type or model of certain tissues, it strikes me that it is far more philosophical to divide them in accordance with their origin from the lacteal glands or the periglandular connective tissue, and at the same time to designate the tissue of which they are composed, making, however, a separate group of cysts, which originate in a different way. For these reasons I prefer the following combined genetic and anatomical classification:

A.

1. Neoplasms derived from the periglandular connective, and constituted by connective tissue or its equivalents, of which two divisions may be made, namely—

a. Those which represent perfected or mature connective tissues, and may, therefore, be called typical. These comprise fibroma, or fibrous tumor; myxoma, or mucous tumor; lipoma, or fatty tumor; and chondroma, or cartilaginous tumor.

b. The second division includes those neoplasms which represent embryonic, unripe, or transitional

connective tissue, and may be termed atypical. It is limited to the genus sarcoma.

2. Neoplasms which proceed from the secreting elements, and are composed of epithelium. Of these, adenoma, or glandular tumor, is a typical epithelial growth, while carcinoma is an atypical epithelial formation.

3. Neoplasms which are derived from and are constituted by higher structures. These are, first, angioma, or a tumor composed of bloodvessels; and, secondly, neuroma, or a growth made up of nerves.

B.

Cysts, which include the formations due to obstruction of the ducts and the accumulation of the secretion of the lacteal glands, and cysts of new formation inclosing echinococci.

In the preceding paragraphs I have used the expressions typical and atypical, which are synonymous with homologous and heterologous of the older pathologists, and with the terms benign and malignant of the clinicians. In the typical growths, a determined model is followed, so that there is a tumor-like reproduction of adult connective tissue or epithelial elements. In the atypical neoplasms, on the other hand, the constituents either extend beyond their normal boundaries, or deviate in form, size, and grouping from the mature epithelial or connective tissue textures, and represent irregular proliferations.

The genetic classification of neoplasms has not met with general acceptance on the part of writers on and teachers of surgery, and many complain of the

gradual abandonment of the division into benign and malignant, and find special fault with the term sarcoma, under which they say pathologists group tumors which possess the greatest possible diversity of clinical history. Carcinoma, however, is open to the same objection; and many purely practical surgeons, in teaching that their benign growths are synonymous with adenocenes, the connective tissue, or the non-carcinomatous neoplasms, and that the malignant ones are equivalent to the carcinomatous tumors of the histologist, hold a position which is no longer tenable. With the view of including a certain class of the non-carcinomatous group, which some clinicians recognize as being partially malignant, they have coined a new expression, and describe sarcoma as a semi-malignant or recurrent growth; but this clinical classification is even worse than the other, since sarcoma, as may be seen in the chapter on that affection, is more infectious than ordinary scirrhus, and only yields in point of malignity to medullary carcinoma. It may be said, however, that the nearer the structure of a mammary tumor approaches that of the physiological adult tissues, whether these be connective or epithelial, the more innocent is the growth, and that the more it departs from the normal standard, or the more atypical it is, the more malignant is the new formation. If the clinician wishes to retain his classification, he should base it upon the fact, disclosed by modern histological investigations, that tumors which originate from the connective tissue have their innocent, semi-malignant, and malignant representatives, while those which are derived from the epithelial elements include semi-malignant and malignant formations.

Thus, in the former series, fibroma, lipoma, and chondroma are absolutely benign; myxoma is semi-malignant, because it exhibits a marked tendency to reproduce itself after removal; and sarcoma, as I have just pointed out, is excessively malignant. Of the epithelial series, the malignant nature of carcinoma is familiar to every one, while adenoma is eminently a recurrent growth.

Of the relative frequency of mammary tumors it is difficult to form an estimate based upon accurate and extended records, since surgeons, for the most part, report their cases merely as adenoid and cancerous. The following table of 649 examples, however, may prove useful in throwing some light upon this point.

AUTHORITY.	Carcinoma.	Sarcoma.	Fibroma.	Adenoma.	Cysts.
Billroth, <i>Chir. Klinik</i> , Zurich, 1860-'67, and Wien, 1868, '69-'70, and '71-'76.	245	19	19	1	3
Langenbeck, <i>Virchow's Archiv</i> , Bd. xviii, p. 51, and <i>Langenbeck's Archiv</i> , Bd. xxi, Suppt. p. 149. . .	157	16	5	..	2
Kuester, <i>Langenbeck's Archiv</i> , Bd. xii, p. 616. . .	28	6	9	..	3
S. W. Gross, <i>Private Notes</i>	100	16	15	1	4
	530	57	48	2	12

Excluding cysts, which constitute only one out of every fifty-four tumors, it will be seen that of 637 neoplasms, 530, or 83·20 per cent., were carcinomatous, and 107, or 16·79 per cent., were non-carcinomatous. This, doubtless, is the true proportion, as I find that Bryant¹ records 400, or 83·16 per cent., of carcinomata, against 81, or 16·83 per cent., of adenocoeles, which are equivalent, according to his views, to the non-carcinomatous growths. Labbé and Coyne give the details of eight sarcomata, eighteen fibromata,

¹ *Op. cit.*, pp. 685 and 689.

two adenomata, and one myxoma. Adding these to the cases in the table, for the purpose of establishing the relative frequency of the non-carcinomatous new formations, we have 136 tumors, of which 66, or 48·52 per cent., are fibromata, 65, or 47·79 per cent., are sarcomata, 4, or 2·94 per cent., are adenomata, and 1, or less than 1 per cent., is a myxoma.

As will have been noticed, lipoma and chondroma find no place in the table. While examples of fatty tumor, developed in the paramammary adipose tissue, are recorded by Warren,¹ Brodie,² Velpeau,³ Cooper,⁴ Roper,⁵ and, more recently, by Billroth⁶ and Bryk,⁷ I am not aware of a single case of circumscribed lipoma occurring in the gland itself. Sir Astley Cooper⁸ and Cruveilhier⁹ have each described an instance of cartilaginous growth; but, in the absence of minute examination in the one, and of a complete account in the other, as well as of any new examples, the fact, to say the least, is very doubtful. Of the neoplasms originating from, and composed of higher tissues, Tripiér¹⁰ records two instances of amyelinic neuroma, while Bryant¹¹ briefly notes a vascular tumor of the mamma, and Image¹² and Conrad Langenbeck¹³ have

¹ *Surgical Observations on Tumors*, p. 228.

² *Lect. on Surg. Path.*, p. 271.

³ *Op. cit.*, p. 247.

⁴ *Op. cit.*, p. 67.

⁵ *Holmes's System of Surgery*, 2d ed., vol. v, p. 267.

⁶ *Pitha and Billroth's Hdbch.*, Bd. iii, Abth. 2, Lief. i, p. 85.

⁷ *Langenbeck's Archiv*, Bd. xvii, pp. 576 and 580.

⁸ *Op. cit.*, p. 47.

⁹ *Traité d'Anat. Path.*, t. iii, p. 824.

¹⁰ *Dict. Encyclop. des Sciences Méd.*, ser. 2, t. iv, p. 408.

¹¹ *Op. cit.*, p. 692.

¹² *Med.-Chir. Trans.*, vol. xxx, p. 109.

¹³ *Nosologie und Therapie der Chir. Krankheiten*, Bd. v, p. 83.

reported similar growths, which had extended, however, from the skin to the mamma itself. Hence, in speaking hereafter of the connective tissue neoplasms, I wish to be understood as referring to fibroma, sarcoma, and myxoma alone, and to these growths, along with adenoma, when alluding to the non-carcinomatous group.

CHAPTER II.

THE EVOLUTION AND TRANSFORMATION OF MAMMARY NEOPLASMS.

THE development and growth, or evolution, of the new formations of the mamma include processes which are, on the one hand, purely theoretical, and, on the other, strictly practical. Whether of epithelial or connective tissue derivation, they all originate through the multiplication or proliferation of the pre-existing cells of the lacteal glands or the stroma, and their descendants, either through direct hyperplasia and the primary production of the typical forms of the mother tissue, or after the model of embryonic tissue formation. The latter plays a more important rôle than the former, since through it nearly all the neoplasms may arise. Just as in the embryo all tissues originate from masses of indifferent formative cells which have proceeded from the primordial cell, so in this mode of the development of tumors, the tissues arise from collections of small, round, indifferent cells, which resemble those of the embryo or those of granulations.¹ In the next stage, these cells are converted into the tissues of which the tumor is composed, and the type followed here is the same as that which prevails in foetal development.

¹ Compare with Virchow, *Cellularpathologie*, 4th ed., chapter xx; *Geschwülste*, Bd. 1, p. 89; and *Archiv*, Bd. lxxix, p. 193.

In the preceding chapter I divided the neoplasms of the mamma in accordance with their derivation from the glandular or periglandular constituents of the organ. While this view of their histogenesis is most simple, and involves the belief that epithelium alone produces epithelium, and that connective tissue arises solely from connective tissue elements, every one who is at all familiar with investigations in this direction is aware that the origin of some of the new growths is still, and will probably always be, a disputed point, and it is for this reason that I cannot overlook the contradictory statements which prevail on the development of neoplasms, and which involve the question whether a cell belonging to a certain class can be the offspring of a cell belonging to an entirely different system.

Up to a quite recent date the origin of the connective tissue neoplasms appeared to be settled beyond the possibility of refutation, and carcinoma was the only debatable ground; but the researches of Creighton, which will be briefly explained presently, have not only opened up a new field of speculative inquiry, but threaten to overturn the generally accepted theory as to the development of the mamma.

With regard to carcinoma, Virchow and his school, which includes many noted observers in Germany, Cornil and Ranvier, Tripier, and Labbé and Coyne in France, and Wilks and Moxon in England, hold that it originates from the fixed connective corpuscles, or, as they are now known, the endothelial cells of that tissue, which undergo a change of type in their multiplication, so that the cells are of heteroplastic origin in contradistinction to the cells of ade-

noma, for example, which merely represent a hyperplasia, or simple numerical increase, of the cells of the acini. In accordance with this doctrine, the carcinomatous bodies, nests, plugs, or cylinders, subsequently break through the enlarged acini, fuse with the epithelial cells, and in this way destroy the glandular structure of the breast.

The derivation of carcinoma from the connective tissue cells is held in a modified form by Von Recklinghausen and Koester, who trace its genesis to the proliferation of the endothelium of the lymphatics, which is the histological equivalent of the connective tissue corpuscle. The transformed endothelium extends, as plugs, into the lymph spaces, converting the cells present in them into epithelial cells, and finally encroaches upon and demolishes the lacteal glands.

In opposition to these views, Billroth, Waldeyer, Langhans, Lücke, Rudnew, and Lancereaux contend that the epithelial cells of the new growth are due exclusively to the continuous multiplication of the preëxisting epithelium, and they base their deductions, not only upon direct observation, but upon the generally accepted histogenetic law that, after the differentiation of the segmentation spheres into the blastodermic layers, epithelial cells are the lineal descendants of epithelial germs alone, and connective-tissue corpuscles of connective tissue germs alone; and they argue that the same law is in force in the pathological development of cells in post-embryonal life.

Other investigators are more conservative, since they refer mammary carcinoma to two sources, name-

ly, primary proliferation of the cells of the acini, and secondary infection of the cells of the stroma by the altered epithelial elements.

In the study of the elements which are present in carcinoma, in addition to the epithelial cells, one has to consider the broods of young cells which infiltrate the periglandular connective tissue, and which impart to the picture an appearance that is scarcely to be distinguished from irritative or chronic inflammatory processes. Whether this small-celled infiltrate, which plays so important a part in the subsequent growth and local extension of carcinoma, is coincident with the proliferation of the epithelial cells; whether it precedes and occasions the latter; or whether it is induced by the growth of the epithelium into the contiguous stroma, are points which are as yet unsettled. It is, moreover, not at all clear whether it represents mobilized connective tissue corpuscles, or emigrant white blood corpuscles, or young epithelial elements which have wandered out of the enlarged acini.

However this may be, Klebs, Rindfleisch, Rudolf Maier, Birsch-Hirschfeld, Neumann, Thin, Creighton, and Woodward, while supporting the epithelial origin of carcinoma, are convinced that the small cells of the stroma are metamorphosed into epithelial elements by contact, or by what is termed epithelial infection or inoculation, as is assumed to be witnessed in the physiological reproduction of epithelium, and in the healing of wounds and ulcers, and not through any independent action of their own, as is claimed by those pathologists who maintain the connective tissue origin of carcinoma. Just precisely how this epithe-

lial infection takes place, and what is infected, are as yet matters of doubt. Rindfleisch and Klebs teach that the epithelial cells leave the acini bodily, wander into the interspaces of the connective tissue, and infect the cells present in that structure, which they look upon as connective tissue corpuscles, but which Doutrelepon, Thin, and Woodward regard as being wandering cells, or lymph, or colorless blood, corpuscles. Other investigators are of the opinion that the process is one of contiguous infection, without there being necessarily a migration of the epithelial cells out of the acini; that is to say, the subepithelial cells of the membrana propria are first metamorphosed, then those of the outermost layer which plays the part of an adventitia, and, finally, those of the periglandular infiltrate. Still another view is that the epithelial masses are prolonged into and infect the cells of the lymph spaces, which may be wandering elements or the offspring of the connective tissue corpuscles.

The latest doctrine in regard to the development of carcinoma, its local extension, and the alveolar grouping of the cells, is that of Creighton,¹ who maintains its epithelial origin and the infection of the cells of the stroma, as do the authorities cited in the preceding paragraph, but with these differences: He endeavors to show, first, that the post-climacteric mamma does not contain many normal acini, but that the epithelial cells which were once contained within the acini positively infiltrate the connective in the form of rows, and lie in contact with its corpuscles, which latter are infected; and, secondly, that the alveolar struc-

¹ *Journal of Anatomy and Physiology*, Oct., 1879, pp. 29-49.

ture is due to the cells pressing aside the parallel bundles of the connective in which they lie. In accordance with this remarkable view, the cells do not wander out of the enlarged acini into the interstices of the connective, nor do they grow as solid plugs into the lymph spaces; but they are found primarily in the alveoli as a result of a partial breaking down of the glandular apparatus of an obsolescent mamma.

Although the fact is well established that the proliferating epithelium does grow into the lymph spaces, and extends as solid plugs or cylinders into the lymphatic vessels, the more modern investigations of Woodward,¹ Waldeyer and Carmalt,² and Langhans,³ not only do not confirm the opinion of Rindfleisch that the lymphatic endothelium participates in the production of the epithelial cells, but they are directly opposed to the view of Koester that carcinoma originates through metaplasia of that structure. Thus they show, by staining with silver, that, although the mammary lymphatics were filled with masses of epithelium, their endothelial lining remained unchanged; and I myself can confirm these observations from recent numerous examinations of sections of a scirrhus cancer of an outlying lobule of the breast of a woman of fifty-two years, which had attained the size of a filbert in five months. Many of the alveoli, when freed of their contents, were seen to be lined with endothelial cells which did not evince the slightest indication of irritation, much less

¹ *The Minute Anatomy of two Cases of Cancer*, War Department, Washington, 1872.

² *Virchow's Archiv*, Bd. lv, pp. 145 and 485.

³ *Archiv für Gynaekologie*, Bd. viii, p. 181, and plate vi, fig. 5.

of proliferation, while others were devoid of endothelial investment. The former were evidently dilated lymphatics, and the latter were due to the extension of the epithelial plugs into the interstices of the newly formed periacinous connective tissue.

In his remarkable and highly original work entitled "Contributions to the Physiology and Pathology of the Breast and its Lymphatic Glands," Dr. Creighton has advanced most novel and heterodox views in regard to the development of the mamma and the histological processes concerned in the genesis of its neoplasms, which are entitled to the most respectful consideration, and which, should they prove to be well founded, will overthrow the assumptions of previous observers on these points.

The generally accepted theory of the development of the breast, namely, that it is due to an infolding of the epiblast or cuticular layer of the embryo, is radically opposed by Creighton, who teaches that it is merely a modified fat gland formed in the mesoblastic layer of the embryo, so that its glandular and connective tissue elements are histologically equivalent. With this understanding, he attempts to show that the "various forms of tumor correspond to the various states of the secreting structure, and to the various degrees of the secretory force, as measured on the physiological scale." In consequence of some morbid influence or diseased excitation, the gland reacts by following the slow process of normal evolution; but, as the evolution or unfolding is spurious, it is associated with the formation of peculiar, imperfect, crude, or waste cellular products, which are derived from the epithelium, and accumulate in the acini, or

leave them to infiltrate the periacinous tissue, instead of passing out of the mamma by the lymphatics to be converted into lymphoid cells in the lymph glands. Hence he ascribes the formation of morbid growths to vacuolation and metaplasia of the secreting cells, the products of which may remain in situ or wander out of the acini, and give rise, in accordance with the stage of evolution which they represent, to carcinoma, sarcoma, myxoma, or chondroma.

"Measured on the physiological scale, the cells of carcinoma belong to the intermediate stage of the breasts' unfolding, and they stand for a half-roused functional stimulus," which is always characterized by a feeble secretory force. If they accumulate within the acini, they produce medullary carcinoma, while the extraacinous infiltration of the interfascicular spaces engenders scirrhus.

Myxoma corresponds to that condition of the secreting structure and to that degree of the secretory force which is associated with the production of mucus, so that "the physiological type is that of the later period of evolution in which the function comes near in its intensity to the perfect lactation."

Corresponding to the same stage of evolution, the cells of the acini become elongated, or are transformed into spindle cells, and leave the acini to accumulate in the periacinous tissue to form sarcoma. Should some of the same transformed epithelial cells remain in the acini, the structure is that of adeno-sarcoma; so that Creighton discards altogether the connective tissue origin of sarcoma, and holds fast to the doctrine that the cells are nothing more nor less than spindle-shaped epithelial cells.

Chondroma also corresponds to the same degree of excitation that affords mucus, and is a cartilaginous transformation of myxomatous tissue, except that, instead of there being a formation of fluid, a hyaline intercellular substance is produced.

Inasmuch as Creighton believes that the stroma of the mammary gland is the same in its histogenesis as the glandular elements, his theory that tumors of the epithelial type and of the connective tissue type are merely different stages in the same series of developmental changes need not strike us with astonishment; and I must confess that his views were so alluring that I have devoted no little time during the past twelve months in attempting to confirm his statements, as far at least as sarcoma is concerned, but with entirely negative results. In point of fact, Dr. Creighton's description of the appearances presented by a scirrhus carcinoma of the male mamma, removed by Mr. Wagstaffe,¹ tends to throw discredit on his own positive conclusions in regard to the extra-acinous infiltration of large, nuclear cells being the distinguishing feature of scirrhus. In his report he states that the acini were irregular in form and enlarged; that "their epithelium remained in situ, as in a healthy acinous gland;" and that the acini were surrounded by a periacinous growth of fibrous tissue.

These opposed and perplexing views as to the histogenesis of morbid growths of the mamma can scarcely excite wonder, when it is remembered that there is still some diversity of opinion as to what constitutes the connective tissue corpuscle; that we

¹ *Trans. Path. Soc. London*, vol. xxvii, p. 235.

are unsettled as to the origin of the broods of young cells which are so extensively met with in carcinoma, sarcoma, and rapidly growing fibroma; that it is impossible by any known methods of treatment to distinguish between these cells and the first cells which afterward become carcinomatous epithelium; and, finally, that we are by no means certain in regard to the development of the mamma.

For my own part, and my views are amplified in the chapters on the different neoplasms, I regard the lacteal glands as the starting-point of adenoma and carcinoma, and the connective as the matricular tissue of the histoid or simple neoplasms. I by no means, however, restrict tumor formation to the continuous multiplication of the indigenous cells of the mamma; but regard the wandering cells as contributing their share in the production of the indifferent cells out of which the connective tissue growths originate, and out of which the newly formed stroma of carcinoma is produced. As will be pointed out in the chapter on the latter affection, I believe that the continuous proliferation and transplantation of the epithelium are quite sufficient to account for all the changes met with in the development and extension of carcinoma, without invoking the mysterious spermatie influence of Mr. Simon, the *action de présence* of the French, or the epithelial infection of the German school, through which the epithelium is assumed to have acquired the property of transforming all cells with which it comes in contact into a likeness to itself.

Having once started, neoplasms increase by central growth, or by the progressive multiplication of their own cells, as occurs in the connective tissue series and

in adenoma, or by peripheral extension along the lymphatics or the perivascular sheaths of the blood-vessels, as is witnessed in carcinoma. In the first mode the tumor remains circumscribed and encapsuled, while, in the second, it infiltrates and destroys the adjacent tissues, and is not inclosed by a fibrous membrane. Sarcoma, however, may extend along the bloodvessels and invade the adjoining tissues, without its capsule being necessarily destroyed. Hence during their further growth and extension carcinoma and sarcoma exhibit malignant attributes, as evinced, in the former, by the continuous growth of the cells into the coverings of the mamma and the subjacent structures, and by their transportation to the associated lymphatic glands and the viscera, where they proliferate and supplant the natural tissues; and, in the latter, by the same phenomena, with the exception of the conversion of the lymphatic glands into secondary growths. As these features will be fully discussed in the chapters on the several growths, they need not detain us here.

Although the tendency of neoplasms is to persist unchanged and increase, yet a time comes when they are subject to the same diseases as are the normal tissues. Thus they may inflame, suppurate, ulcerate, and die; and they are liable to various degenerations and infiltrations, as the fatty, caseous, mucoid, telangiectatic, colloid, pigmentary, and calcareous, which give rise to certain subdivisions, and to which I shall again have occasion to refer when discussing the individual growths.

From a histological as well as a practical point of view, it is a matter of great interest to determine

whether a mammary neoplasm ever so changes its original type that one which has remained innocent for a series of years finally degenerates into one of a malignant nature, or one which possesses the structure of a carcinoma or a sarcoma.

Among French writers,¹ Verneuil, Houel, and Desprez adduce cases to prove the transformation of so-called adenoid tumors into carcinoma, while Ranvier, Broca, Richet,² and Richelot³ deny such an occurrence. Billroth⁴ has described and delineated the development of carcinoma from an adenoid sarcoma, and both he and Klebs⁵ state that fibrous tumors are very frequently the starting point of cancer. Sir James Paget⁶ has quite recently pointed out that not only hard mammary glandular tumors, but certain ill-defined and tough, rather than hard, indurations may become carcinomatous. The tendency of true adenoma to pass into carcinoma is so well established that it need not be dwelt upon; and it need scarcely be said that the epithelium of the acini of these, and of the so-called adenoid growths, as well as of the lobular indurations, is the point of departure of the transformation.

Billroth,⁷ Labbé and Coyne,⁸ and Duplay⁹ are of the opinion that the metamorphosis of fibroma into sarcoma is so frequent that primary sarcoma of the

¹ *Bull. de la Soc. Anat.*, t. xliv, p. 285 et seq.

² *Le Practicien*, No. 14, 1879, p. 163.

³ *Des Tumeurs Kystiques de la Mamelle*, 1878, p. 102.

⁴ *Virchow's Archiv*, Bd. xviii, p. 78, and *Surgical Pathology*, edited by Hackley, p. 647.

⁵ *Op. cit.*, p. 1207.

⁶ *St. Bartholomew's Hospital Reports*, vol. xiv, p. 65.

⁷ *Chir. Klinik*, Wien, 1871-'76, p. 261.

⁸ *Op. cit.*, pp. 269, 283, and 363.

⁹ *Op. cit.*, p. 628.

mamma is very rare; and this view would seem to be verified by the fact that a tumor which has remained of the volume of a walnut for fifteen years may in three months rapidly increase to the size of a double fist;¹ or attain a circumference of twenty-six inches and a weight of seven pounds in six months, after having existed, not larger than an egg, for a year and a half.² In such cases it would appear as if a fibroma had been converted into a sarcoma through multiplication of its cells and increased vascularization, although the opponents of a change of type might urge that a sarcoma may remain latent for many years, when, without obvious cause, it begins to grow rapidly through proliferation of its cells, and a proportionate decrease of its fibrous intercellular substance.

Tumors of the connective tissue and of the epithelial series may coexist in one or both mammae. Thus, Richet³ records an example of two fibrous growths, of twenty-two years' duration, in the lower segment, and a recent carcinoma in the upper segment of the same gland. Paget⁴ has observed a similar occurrence; and Waldeyer⁵ met with a carcinoma and eight fibromata in one breast. Langhans⁶ reports an adenoma, of nine years' growth, and a carcinoma, of six months' duration, side by side. De Morgan⁷ and Billroth⁸ have each seen a cystic sarcoma in one breast, and a scirrhus carcinoma in its fellow.

¹ Maignac, *Bull. de la Soc. Anat.*, t. lli, p. 428.

² Marchand, *Gazette des Hôpitaux*, No. 51, 1869, p. 196.

³ *Loc. cit.*, ante.

⁴ *Op. cit.*, p. 565.

⁵ *Virchow's Archiv*, Bd. lv, p. 124.

⁶ *Ibid.*, Bd. lviii, p. 147.

⁷ *Trans. Path. Soc. Lond.*, vol. xix, p. 394.

⁸ *Chir. Klinik*, Wien, 1871-'76, p. 263.

CHAPTER III.

THE ETIOLOGY OF NEOPLASMS OF THE MAMMA.

THE causes which determine the development of the new formations of the mammary gland are obscure; but they demand something more than a passing notice, since they have been, and are still, relied upon as furnishing data for the differential diagnosis of the non-carcinomatous and the carcinomatous neoplasms.

The traditional opinions in regard to the antecedents, precursors, or conditions which favor the occurrence of the non-carcinomatous growths, are that they are influenced by traumatism, comparative youth, celibacy, sterility, disordered menstruation, and a nervous, excitable, or hysterical disposition; or, when they originate in married women, that they appear most frequently during pregnancy and lactation. The development of carcinoma, on the other hand, is presumed to be influenced by the married state, by prolificness, and by the cessation of the menstrual function.

That injury is capable of setting up a sufficient amount of irritation of the component tissues of the mamma to eventuate in the formation of the new growths cannot be doubted; but that it is a factor peculiar to the non-carcinomatous group is not shown by an analysis of the cases upon which this mono-

graph is based, as the simple neoplasms were ascribable to trauma in 11.94 per cent. of all instances, while 11.70 per cent. of the carcinomata could be traced to the same cause.

Of the non-carcinomatous subjects in whom the social condition and the activity of the sexual apparatus are noted, 61 per cent. were, or had been, married, and in only 15.55 per cent. of these did the growth develop during pregnancy or lactation; 86 per cent. had borne children; 93 per cent. were menstruating, and 6 per cent. of these performed that function irregularly; while only 3 per cent. were hysterical. Of the carcinomatous patients, 88.22 per cent. were, or had been, married; 83 per cent. were fruitful; and 61 per cent. were regular as regards the catamenial function when the tumor was first observed. In 5 per cent. of this class the growth developed during pregnancy or lactation. In only 40 per cent. of the non-carcinomatous neoplasms were the patients comparatively young, that is to say, they had not attained the age of thirty.

These facts show conclusively that, contrary to the generally received views, the non-carcinomatous neoplasms are most common, after the thirtieth year, in married and prolific females, who are not the subjects of disordered menstruation or of a nervous habit; and that their development is attributable to trauma in only one example out of every eight and a half, and to pregnancy or lactation in less than one instance out of every seven. A comparison of the percentages will, moreover, demonstrate that an almost equal number in each class are prolific, and that the apparent differences in the menstrual function and in the social

condition may be explained by the fact that fewer women, the subjects of the non-carcinomatous neoplasms, are to be expected to be married, in consequence of their comparatively early age, while, for the same reason, more are menstruating. Hence these data are not favorable to the current view that the development of mammary growths is influenced by the state of the organs of reproduction, although at first sight pregnancy and lactation would seem to bring about such changes in the mamma, such as increased supply of blood and activity of cell production, as to predispose it to tumor formation; but a little closer examination will show that the proportions existing between sterile and fruitful, and single and married women, affected with mammary growths, correspond to the proportions which exist between females who are free from tumors.

Among the causes which do really appear to influence the development of carcinoma, great weight is attached to hereditary transmission by Paget,¹ which he regards as evidence of the constitutional origin of that affection, just as he looks upon local reproduction and the formation of metastatic tumors in the viscera as signs of an original cancerous taint. While much may be said in favor of this view, I must state explicitly that I am no believer in the constitutional derivation of carcinoma, but regard the inheritance as merely the expression of the transmission of a predisposition to a local disease, just as is seen in

¹ *Trans. Path. Soc. London*, vol. xxv, 1874: Discussion on Cancer. This extremely interesting discussion embraces the recent views of many of the most distinguished English pathologists. In it, Sir William Gull, Arnott, Hutchinson, Payne, Moxon, and others maintain the strictly local origin of carcinoma, in opposition to Sir James Paget, who looks upon it as a disease of the blood.

the hereditariness of lipoma, chondroma, or sebaceous cysts in other organs or tissues, which no one regards as being the local manifestation of a constitutional or a blood vice. Recurrence after removal, the contamination of the associated lymphatic glands, and the development of precisely similar growths in the viscera, are surely explicable on the ground that the primary tumor acts as a focus of infection of neighboring and distant parts, without invoking the theory of a constitutional taint. Be this as it may, the influence of heredity is not witnessed in the non-carcinomatous tumors, while it is seen in one case out of every nine of the carcinomata, and therefore serves as a point of distinction between the simple and cancerous neoplasms.

Among the precursors of carcinoma, eczema and psoriasis of the nipple and areola have recently attracted considerable attention, as was first pointed out by Sir James Paget;¹ and the connection between these affections has been observed by Butlin, Morris, Lawson, Busch, and other surgeons, including two cases under my own care, one of which I made the subject of a report to the Pathological Society of Philadelphia.²

The cases of Paget, fifteen in number, occurred in women varying in age from forty to sixty years, in the majority of which the nipple or areola was the seat of an intensely red, very finely granular, raw surface, discharging a copious, clear, yellowish, viscid fluid, and attended with a tingling, itching, or burning sensation. In some the eruption presented the

¹ *St. Bartholomew's Hosp. Reps.*, vol. x, p. 87.

² *Phila. Med. Times*, July 5, 1879, p. 486.

ordinary characters of chronic eczema, while in others it was dry, like psoriasis. With the view of determining whether these affections could be regarded in the light of cause and effect, Mr. Butlin¹ examined two breasts, the nipples of which were the seat of chronic eczema, and found that the ducts were widely dilated, and contained frequently large masses of squamous epithelium, and that the connective tissue was infiltrated with small cells. In an induration which existed in one of the breasts, the acini were also found to be enlarged and filled with epithelium. Although there was no carcinoma in either case, these appearances indicated the commencement of morbid processes which lead to the development of that affection. Continuing his investigations, Mr. Butlin,² a year subsequently, described the minute anatomy of two instances of scirrhus of the mamma which was preceded by eczema. In both, the tissues between the neoplasm and the areola were somewhat indurated, and the appearances were the same as they were in the former cases, with the addition, in one, of cell-nests in the thickened portions of the nipple and areola, and of "much greater enlargement of the acini and ducts in the centre of the carcinoma than in the previous cases, so that they had become confluent, and their contents had made their way into the surrounding tissues."

Recent investigations appear to point to something more than an ordinary eczematous condition, since Dr. Thin³ concludes, from a study of sections derived from four specimens, that the disease is super-

¹ *Med. Chir. Trans.*, vol. lix, p. 107.

² *Ibid.*, vol. lx, p. 153.

³ *London Lancet*, vol. ii, 1879, p. 874, and vol. i, 1880, p. 92.

ficial epithelioma of the mouths of the lacteal ducts, from which it extends along the smaller ducts into the substance of the mamma, and finally infiltrates the connective tissue by breaking through the membrana propria, thereby giving rise to the tubular or duct form of carcinoma, while the changes in the tissues of the nipple and the surrounding skin are solely of an irritative nature.

While it may be true that the primary lesion is sometimes carcinoma of the ducts contained within the mamilla, I am of the opinion that cancer may result from ordinary eczema or psoriasis of the nipple, just as epithelioma of the tongue may follow ichthyosis, or hyperplasia of the epithelium, of that organ. From the clinical side, the long duration of the eruption before the appearance of the carcinoma in the gland, and its curability, as Busch¹ has pointed out, and as I myself have witnessed in one case, by the application of a four-per-cent. solution of soda, or as Chambers² has shown, by a lotion containing equal parts of glycerine and laudanum, without the development of cancer, surely point to a simple local condition. From the anatomical side much may be said in favor of the same view. Thus, it is not quite clear that Thin really met with carcinoma in all of his examinations, as he says that the tumors which he inspected were the same as those which are described as adenoid or adenomata by English and some German writers, and by Labbé and Coyne as epithelioma intracanaliculaire, which they distinctly state is synonymous with the true adenoma of certain authors.³

¹ *Langenbeck's Archiv*, Bd. xxi, p. 687.

² *Lancet*, vol. ii, 1879, p. 743.

³ *Op. cit.*, p. 366.

Apart from these considerations, neoplasms other than carcinoma may be preceded by simple eczema or psoriasis. Thus, in the patient from whom figs. 9 and 12 were derived, a spindle-celled sarcoma, of seven years' duration, had been preceded by psoriasis of the nipple ever since she could remember; and she frequently picked off crusts which she said looked like pearl buttons. In a case of true adenoma, recorded by Labbé and Coyne,¹ the woman had been in the habit, for nearly thirty years, of removing small scales from the orifices of the ducts, which was followed by the escape of a lactescent fluid.

These data, which throw new and unexpected light upon this point, demonstrate that eczema or psoriasis of the nipple, or Paget's disease, to use the term suggested by Mr. Erichsen, may antedate both divisions of neoplasms. Those affections were met with in 2 out of 138 non-carcinomatous growths, or in the ratio of 1·44 per cent., while they were the cause of 7 out of 675 cases of cancer, or in the proportion of 1·03 per cent., as will again be pointed out in the chapter on carcinoma.

Another assumed predisposing cause of carcinoma is puerperal mastitis resulting in chronic, circumscribed indurations, which are composed of glandular structure, surrounded by densely hard or cicatricial connective tissue. Hence these lumps do not differ from the normal breast during senile involution, and it is quite natural that, during a subsequent lactation, or under the influence of the period of life when carcinoma may be looked for, the included lacteal glands should not react physiologically, but grow

¹ *Op. cit.*, p. 356.

atypically and lay the foundation of cancer. Of 365 women who had borne children there was antecedent mastitis in 71, but in only 30 of these did an induration remain from which carcinoma originated. Hence the disease appears to be connected with this condition in 8.21 per cent. of all cases; but it is interesting to note that these lumps remain quiescent for a period which varies from four to twenty-eight years, or a little more than fourteen years on an average; or, in other words, until the age arrives which is most favorable to the development of the new growth. In one of my own cases the interval between the appearance of the tumor and the induration left by suppurative mastitis was twenty-six years, the patient having been twenty years old at the date of the inflammation, and forty-six at the date of the appearance of the carcinoma; while in one recorded by Winiwarter the interval was twenty-eight years. The non-carcinomatous growths may also start from similar lumps, as happened in 1.44 per cent. of all cases, the proportion being, however, far less than is witnessed in the preceding group.

On reviewing the predisposing and exciting causes of mammary neoplasms it will be seen that, with the single exception of hereditability, not one is of much value in tracing the genesis of, or in aiding in the determination of the diagnosis between, the simple and the carcinomatous. Hence I am of the opinion that their development is connected with the changed proportions of the component tissues of the breast at different periods of life, and that the condition of the tissues is, as a rule, indicated by the age of the patient.

The non-carcinomatous growths occur, on an average, at the thirty-third year; only 30·37 per cent. develop after the age of forty, or when the physiological life of the mamma is beginning to be impaired;¹ 15·55 per cent. appear before the twentieth year; and 5·18 per cent. are met with before the establishment of menstruation. Previously to the age of forty, or during the period of the structural perfection of the gland, or when the proportion existing between the epithelial and connective tissue constituents is normal, fibromata and sarcomata are the most common of the neoplasms; or, if the epithelium be disturbed or excited, it reacts more in accordance with its physiological evolution, and adenoma results. When carcinoma occurs between the third and fourth decades, it signifies that the breast is prematurely old.²

The carcinomatous tumors develop, on an average, at the forty-eighth year; 77·26 per cent. appear after the age of forty; and they are never met with before the twentieth year. With advancing age the connective tissue stroma of the mamma preponderates, and, as it contracts, the lacteal glands, for the most part, atrophy and disappear through absorption of their cells which have undergone fatty degeneration. If, however, instead of passing through these normal obsolescent processes, the contracting fibrous tissue produces irritative changes in the epithelial cells, the

¹ Although it is, if I do not mistake, customary to regard the mamma as being perfect up to the age of forty-five, when, on an average, the catamenial function ceases, I am of the opinion that the secreting structure begins to waste at forty, and that the stage of decline occurs several years earlier in feeble women.

² Atrophy of the lacteal glands now and then shows itself in early life through their failure to develop during pregnancy, and through the absence of milk after parturition.

latter increase actively and abnormally, and lay the foundation of tumors which are carcinomatous in 98·80 per cent. of all instances. At this same period the fatty constituents of the connective are excessive, and, as Virchow has shown the parallelism between adipose and mucous tissues, if the fatty elements react instead of the epithelial, they revert to their original mucoid state, and a myxoma is developed.

It will thus be seen, that age, or rather the anatomical arrangement of the stromal and epithelial constituents as indicated by the age, does exercise a most marked influence upon the kind of neoplasm to which the mamma is most liable. Among themselves they manifest, however, some decided variations, as is indicated by the subjoined tabular statement of 777 cases in which the age is noted. For convenience of reference I have separated their occurrence at the different decades.

	Fibroma.	Sarcoma.	Myxoma.	Adenoma.	Carcinoma.
Years.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Between 10 and 20	11 or 22	8 or 13·33	.....	2 or 11·11	.....
“ 20 “ 30	18 “ 36	10 “ 16·16	1 or 14·29	4 “ 22·22	18 or 2·80
“ 30 “ 40	11 “ 22	23 “ 38·33	.....	6 “ 33·33	128 “ 19·93
“ 40 “ 50	7 “ 14	13 “ 21·66	4 “ 57·14	5 “ 27·77	245 “ 38·16
“ 50 “ 60	3 “ 6	4 “ 6·66	2 “ 28·57	1 “ 5·55	165 “ 25·70
“ 60 “ 70	.....	2 “ 3·33	.....	.....	78 “ 12·14
“ 70 “ 80	.....	.....	.....	.....	8 “ 1·24
Cases.....	50	60	7	18	642

Arranging the cases in accordance with the functional activity and physiological life of the mamma, a further analysis shows that there appeared

	Fibroma.	Sarcoma.	Myxoma.	Adenoma.	Carcinoma.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
During the developmental period.	6 or 12	1 or 1·16	.....	.....	.....
During the period of greatest activity.....	34 " 68	40 " 66·66	1 or 14·29	12 or 66·66	146 or 22·74
During the period of functional decline.....	10 " 20	19 " 31·66	6 " 85·71	6 " 33·33	496 " 77·26
	50	60	7	18	642

From these facts it is evident that the only tumors that develop before the sixteenth year are fibromata and sarcomata, and that the chances are six to one in favor of the former. It is further quite clear that between the sixteenth and fortieth years they are most common in the following order: fibroma, sarcoma, adenoma, carcinoma, and myxoma; and that after the age of forty the order is reversed, being myxoma, carcinoma, adenoma, sarcoma, and fibroma. In other words, structural perfection of the mamma renders it most obnoxious to fibroma, sarcoma, and adenoma, while atrophy or decay predisposes it to myxoma and carcinoma.

CHAPTER IV.

THE ANATOMY OF THE CONNECTIVE TISSUE NEOPLASMS.

THE connective tissue neoplasms possess certain features in common which I shall consider, with the view of avoiding needless repetition, before discussing the individual growths of this series. Apart from the facts that they are usually round or ovoid, bossed, lobulated, or nodular on their surface, and invested by a fibrous capsule which separates them from the remainder of the gland, but with the latter of which they are frequently more or less closely connected, their coarse appearance, on section, indicates that they may be solid, cystic, or vegetating. Of the 120 cases that I have studied, 60, or 50 per cent., were solid; 7, or 5·83 per cent., were cystic; and 53, or 44·16 per cent., were vegetating, or proliferous. Among themselves, however, they evince striking differences in their macroscopic features, since 60 per cent. of the fibromata are solid, and 40 per cent. are vegetating; 41·6 per cent. of the sarcomata are solid, 11·6 per cent. cystic, and 46·6 per cent. vegetating; while 50 per cent. of the myxomata are solid, and 50 per cent. are vegetating. The cut surfaces of the solid tumors are smooth and unbroken. The cystic and vegetating forms, on the other hand, are pervaded by fissures, fluid cysts, or cysts containing solid

growths; but as the cysts, whether they be barren, fluid, or solid, arise primarily in the same way, and as the clinical features of the cystic and vegetating varieties are essentially the same, I will, to avoid confusion, speak of solid and cystic tumors, including, under the latter term, the cystic and vegetating, as the vegetations merely represent a further stage of development of the solid growths.

The solid connective tissue neoplasms, which constitute 50 per cent. of the entire number, correspond, for the most part, to the non-cystic adenocenes, adenomata, and mammary glandular tumors, and to those to which some authors prefix the term adeno, as minute examination discloses that the majority contain the remains of glandular elements, as is shown in fig. 6. These may be entirely normal, or the epithelium may have sustained changes in form and arrangement, or the acini may be dilated, or they may be undergoing obliteration, or, as I have witnessed in several examples, they disappear altogether. In addition to these features, there are very few specimens which do not contain enlarged and deformed ducts, which are the microscopic representatives of the irregular fissures, slits, or cysts that exist macroscopically in the cystic tumors. In one example out of every seven or eight they are, moreover, occupied by cystoid cavities, which are due either to fatty or myxomatous degeneration of their cellular elements, or to fatty and mucoid changes of the irritated epithelium of the acini and ducts. In the former events, the contents of the spaces, which have no epithelial lining, are yellowish, greenish, sanguinolent, or bloody, while, in the latter, they are serous, mucoid, or even pulsa-

ceous. Whether their origin be glandular or periglandular, they represent retrograde metamorphoses, and although they may coexist, they must not be confounded, with the true cysts of the second type of tumor, which represent a further stage of evolution, and arise in an entirely different way.

The cystic connective tissue neoplasms, which embrace 50 per cent. of all cases, and which were formerly described as, or included under, the carcinoma hydatides of Sir Charles Bell,¹ the vesicular scirrhus of Benedict,² the hydatid or encysted tumor of Sir Astley Cooper,³ the tuberos cystic tumor of Cæsar Hawkins,⁴ the cystosarcoma simplex, proliferum, et phylloides of Johannes Müller,⁵ the serocystic tumor of Sir Benjamin Brodie,⁶ the proliferous mammary cysts and mammary glandular tumors of Sir James Paget,⁷ the cystoid adenocèles or adenomas of Birkett,⁸ the cystoide and papillare drüsengeschwülste of Foerster,⁹ and the true cystic adenocèles of Bryant,¹⁰ are now termed, in accordance with the constitution of their stroma, cystic fibromata, cystic sarcomata, and cystic myxomata. When the cysts are barren of vegetations, the tumors are simply cystic or pericanalicular;¹¹

¹ *Med.-Chir. Trans.*, vol. xii, p. 224, 1823.

² *Bemerkungen über die Krank. der Brust- und Achseldrüsen*, p. 73, 1825.

³ *Lect. on the Princ. and Prac. of Surgery*, by Tyrrell, vol. ii, p. 163, 1825, and *Ills. of the Dis. of the Breast*, p. 20, 1829.

⁴ *London Medical Gazette*, vol. i, N. S., p. 951, 1838.

⁵ *Ueber der Feinern Bau*, etc., erste Lief, p. 56, 1838.

⁶ *Clinical Lectures on Surgery*, Phila., 1846, p. 206.

⁷ *Lond. Med. Gazette*, N. S., vol. xii, p. 1059, and vol. xiii, p. 309, 1851, and *Lect. on Surg. Path.*, 3d ed., pp. 427 and 559, 1870.

⁸ *Guy's Hosp. Repts.*, ser. 3, vol. i, p. 131, 1855, and *Holmes's System of Surgery*, ante.

⁹ *Hdbch. der Path. Anat.*, 2d ed., Bd. ii, p. 482, 1863.

¹⁰ *Guy's Hosp. Repts.*, ser. 3, vol. x, p. 106, 1864, and *Surgery*, ante.

¹¹ Labbé and Coyne, *op. cit.*

whereas if the dilated ducts are filled more or less completely by intracystic growths, they are variously known as vegetating, arborescent, papillary, proliferous, endocanalicular,¹ or intracanalicular tumors,² and constitute 86 per cent. of all the cystic neoplasms of the mamma.

As was first demonstrated by Brodie, and confirmed by Reinhardt,³ the cysts are due to ecstasia of the lactiferous ducts, which are very apparent, even on the cut surfaces of growths not larger than a pullet's egg, as variously branched, tortuous, or intercommunicating fissures, slits, or clefts. In smaller growths, of the size, for example, of an almond, the initial steps of the change can be followed with the microscope, which shows conclusively, as is represented in fig. 1,⁴ that these fissures are nothing more than the ducts, and sometimes the acini, the walls of which have been mechanically disparted or drawn asunder by the eccentric growth of the peritubular and periacinous tissue of the neoplasm. In some specimens, even of large dimensions, when, in addition to enlargement of the ducts, there is progressive new growth of their membrana propria, the fissures are so stretched that they persist as such, their inner surfaces being merely moistened by a slight amount of clear viscid fluid. In others, again, through the accumulation of their contents, they assume the form of rounded or elongated and wide cavities, and may

¹ Labbé and Coyne, *op. cit.*

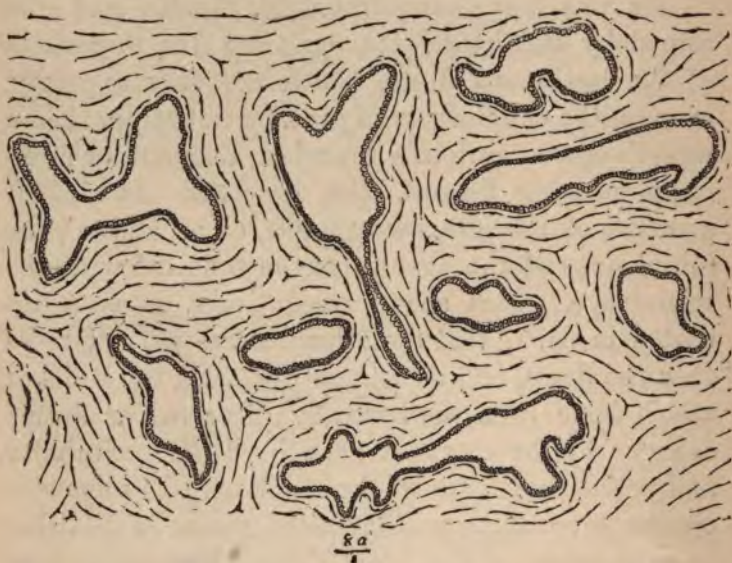
² Virchow, *op. cit.*, Chapters on fibroma, sarcoma, and myxoma.

³ *Path. und Anat. Untersuch.*, p. 126, Berlin, 1852.

⁴ From a section of a fibroma, of two years' duration, which I enucleated from the upper and outer portion of the left mammary of a single woman, twenty-two years of age.

even contain as much as a quart of serous, mucous, lactescent, or sanguinolent fluid. In the majority of examples, however, the interstitial or pericanalicular tissue grows or projects into the deformed ducts as

FIG. 1.



CYSTIC FIBROMA.—Showing transverse and longitudinal sections of dilated and elongated ducts, to the undermost one of which acini are attached, lined by columnar epithelium.

variously shaped masses, as the papillary, clavate, dendritic, cauliflower, spheroidal, lobulated, or pedunculated, with broad or constricted bases. They are covered by glandular epithelium, which is usually round or cuboid, but may be distinctly columnar, and they may either lie loosely in the cysts, or fill them entirely. These appearances are quite visible to the unaided eye, even in small tumors, or if they are ap-

parently absent, they can be detected on minute examination, as is shown in fig. 2.¹

The microscopic features are coarsely followed in

FIG. 2.



CYSTIC FIBROMA.—*a a*. Dilated ducts occupied by incipient vegetations. The epithelium has, for the most part, disappeared, owing to its detachment through the hardening process to which the specimen was subjected. *b*. Duct partly filled by hyperplastic epithelium.

the larger neoplasms, so that the intracanalicular projections are very evident to the naked eye, as in fig. 3.² In other specimens, as in fig. 4,³ they constitute

¹ From a section of a fibroma, as large as a hickory-nut, and of fourteen months' duration, which I enucleated from just above and slightly to the inside of the areola of the right mamma of a healthy single woman, twenty-five years of age.

² From a specimen removed by Professor Gross from a sterile married woman, thirty-three years of age. The disease was of three years' duration, and affected both breasts. The intracanalicular tubers were all convex, broadly based, and varied from one third of an inch to an inch in height and breadth. On section the majority had a lobed appearance, while a few, as the one depicted in the figure, were granular, and contained dilated ducts.

³ From a specimen in the cabinet of Professor Gross, which is devoid of history.

pedunculated growths, which look not unlike miniature bunches of grapes.

In their histological construction they do not dif-

FIG. 3.



INTRACANALICULAR FIBROMA.—A large tuber, a portion of which is removed to show the dilated ducts by which it is traversed, is seen to project into a greatly enlarged duct cyst. What may be termed the visceral and parietal layers of the wall of the cyst are clearly shown.

fer from the remainder of the growth, and, like it, they are liable to various transformations, as the

FIG. 4.



INTRACANALICULAR FIBROMA.—Showing lobulated masses dependent from long and narrow pedicles.

telangiectatic, fatty, and myxomatous. Apart from softening cysts, they may themselves give rise to

secondary cystic conditions, which serve to impress one with the idea that they contain glandular tissue. These cysts, which are in reality follicular or space cysts, or modified retention cysts, result from the compression and fusion of the surfaces of contiguous papillary vegetations at one or more points, so that the interpapillary spaces are converted into recesses or follicles, as is shown in fig. 5, from one of my

FIG. 5.



INTRACANALICULAR FIBROMA—Showing three papillæ, the spaces between which are converted into follicular cysts. In the cavity on the right the epithelium is seen to have multiplied; while the central papilla is projecting an offshoot into the cyst to its left.

specimens, the epithelial lining of which secretes a mucous fluid.

Independently of these pseudotubular glands the vegetations now and then include preëxisting glandular structure, which is not only definable by the microscope, but is indicated, as in fig. 3, by the dilated ducts which traverse them.

In addition to their variable consistence, color, size, shape, and transformations, these vegetations and their containing cysts are of interest in respect to

some doubtful views that are entertained as to their mode of origin and the relations which they bear to the solid connective tissue mammary growths. Paget, Bryant, and Birkett, for example, teach, in the first place, that they may arise independently of dilated ducts; secondly, that when they are found in connection with the ducts, they develop from their inner surface, instead of making their way into them, or rather, displacing and deforming them; and, thirdly, that they give rise to the solid tumors.

With regard to the first of these statements Paget says that, "it is possible that some of the cysts that bear vascular growths are derived through transformation and enormous growth of some elementary structure of the gland." Bryant refers them to a collection of fluid in the connective tissue framework of the mamma; and Birkett, while he believes that the fissures depend upon the absence of connective tissue, declares that, "it is the envelope or capsule of the new growth detached from its surface by the accumulation of fluid simply, which constitutes the so-called cysts," and from the walls of which the vegetations spring. From the facts, however, that these cavities are lined by glandular epithelium, and can frequently be traced to the nipple; that the transformation of the elementary structure results in softening or extravasation, instead of autogenous, cysts; and that the external capsule of the cystic growths is more or less intimately adherent to them, these modes of cyst formation can in no wise be entertained.

That the vegetations grow from the inner surface of the cysts is not more tenable, as is proved by their

minute structure, which is that of the mass with which they are connected, and of which they are only prolongations; by their occasionally including glandular tissue; and by their being invested by the wall of the duct in the form of an epithelial-clad membrane. Even the delicate dendritic vegetations, which contain comparatively little connective tissue, are papillary proliferations of the pericanalicular tissue of the tumor, and not of the ducts themselves.

In his lecture on serocystic tumors of the breast, delivered upward of thirty years ago, Brodie stated that, "under certain circumstances the cysts become completely filled up by morbid growths, so that their cavities are obliterated, the tumor being thus converted into a solid mass"; but he regarded the vegetations as being composed of "organized albumen or fibrin."

Paget,¹ five years later, taught that the fusion of the intracanalicular growths with the walls of the cysts transformed the cystic into solid mammary glandular tumors, and he entertains this view at the present day, in which he is supported by Collis.² From a minute examination of thirty-one specimens of fibroma and sarcoma, I have been unable to trace such a transformation, although it should be stated that Goodhart,³ as late as 1872, admits the transition. In small growths, fibromata, for example, one readily sees that the fibrous constituent is in excess, and that the glandular tissue is sparse; that the first appearance of cystic changes in the growing fibrous

¹ *London Med. Gazette*, ante.

² *The Diag. and Treat. of Cancer and the Tumors Analogous to It*, p. 291.

³ *Edinburgh Medical Journal*, vol. xvii, part 2, p. 1015.

element is due to secondary ectasia of the ducts, which frequently extends to the acini; and that the vegetations are nothing more than hernial protrusions into the dilated secreting apparatus, so that the tumor must originate outside of instead of within the ducts. In the large neoplasms, which, on superficial examination, appear as if a solid growth had originated by the close packing and adhesion of the vegetations to the walls of the cysts, the microscope discloses, as I have just witnessed, in a section through such a stuffed lobe, that the fimbriated ends of the vegetations are, for the most part, not even in contact with the cyst, since only two of the eleven touch it without adhering. A close inspection, moreover, shows that when the cysts have become filled with the intruding masses, the latter perforate one cyst to enter another, so that neither the minute nor the gross appearances indicate that the formation of a cyst is the first step in the evolution of certain mammary tumors. Directly opposed to Paget's doctrine is that enunciated five years ago by Cadiat,¹ who teaches that a solid adenoma, or tumor composed of hyperplastic lacteal glands, is the source of the cystic growths; in other words, that the mammary glandular tumor of Paget is the starting-point of cystic and vegetating tumors, and is not developed from them.

In addition to the solid ingrowths, the dilated ducts usually contain fluid of a mucoid nature, which may be bloody if the vegetations are very vascular. In quantity it may be scarcely more abundant than to moisten the parts, or it may amount to many ounces, and serve to increase the lobulated or nodu-

¹ Robin's *Journal de l'Anat. et de la Phys.*, p. 183, 1874.

lar outline of the neoplasms of which it forms a part. Now and then it is discharged by the nipple, but rarely in large quantities.

The connective tissue neoplasms may be diffused, or involve the entire mamma, as happens particularly in fibromata, when they constitute the affection called elephantiasis of the breast by Virchow,¹ or, as it is usually known, general hypertrophy; or the morbid process may be, and generally is, restricted to a single lobule or to several adjacent lobules, when they are denominated tuberos, lobular, or circumscribed. The latter are invested with a capsule of new formation, which serves to distinguish them from the carcinomatous tumors, and which admits of their being moved about in all directions, although in many instances their deep surface is attached to the gland by a more or less broad pedicle, in which vessels, or glandular tissue, or even cysts, can be detected. This is especially true of the fibromata and small sarcomata, so that, as I have not infrequently witnessed, a portion of the breast has to be removed along with the tumor. In such cases, if it happens that an operation be conducted during lactation, milk may be found in the embedded lobules, as in an example of adenoid sarcoma recorded by Billroth;² or that fluid may be discharged by the wound, as in two instances of fibroma from the practice of Cras,³ and Cruveilhier,⁴ and in one of recurrent spindle-celled sarcoma reported by Le Fort.⁵

¹ *Op. cit.* Trad. Franç., vol. i, p. 325.

² *Virchow's Archiv*, Bd. xviii, p. 68.

³ *Bull. et Mém. de la Soc. de Chir.*, vol. iii, p. 13.

⁴ *Ibid.*, p. 153.

⁵ *Ibid.*, vol. ii, p. 487.

In the circumscribed or lobular neoplasms the remainder of the gland is, when the growth is voluminous, pushed aside, flattened, spread out, or even atrophied, although it now and then happens in sarcoma and myxoma that it is invaded by the rapidly proliferating tissue. It is also not very uncommon for the investing capsule and overlying tissues to give way and permit a portion of the mass to protrude externally. In a unique case recorded by Satterthwaite,¹ of New York, an intracanalicular fibroma protruded through the dilated ducts, without the intervention of ulceration, so that the nipple was surmounted by a mass of tissue which was eight lines high, and looked like exuberant granulations. These neoplasms also present some other features in common, but as they will be described under the individual tumors, they need not detain us

¹ *The Medical Record*, p. 635, 1874.

CHAPTER V.

FIBROMA.

NEOPLASMS composed of hyperplastic connective tissue, in which normal or variously altered glandular elements are sparingly interspersed, are classified as fibromata. From the persistence mainly of the acini, they are included by Birkett¹ in his first group of adenomata, which he describes as being "compact, dense, firm, fibrous, lobulated, and invested by their own fibrous capsule"; and they are synonymous with the solid fibroid glandular tumors of Foerster,² the adenomata with predominance of stroma of Broca,³ and the corps fibreux of Cruveilhier.⁴ That they form at least a part of the mammary glandular tumors of Paget is evident from the statement, that the connective tissue was very abundant in most of the specimens he had examined.⁵ From the very frequent presence of preëxisting lacteal glands in their midst, Green,⁶ Duplay,⁷ and Billroth⁸ term them adenofibro-

¹ *Holmes's System of Surgery*, vol. v, p. 255.

² *Op. cit.*, Bd. ii, p. 481.

³ *Op. cit.*, t. ii, p. 441.

⁴ *Ante.*

⁵ *Op. cit.*, foot-note, p. 559.

⁶ *Op. cit.*, p. 141.

⁷ *Op. cit.*, p. 615.

⁸ *Hdbch. von Pitha und Billroth*, Bd. iii, Abth. 2, Lief. i, p. 89, and *Chir. Klinik*, Wien, 1871-'76, p. 261.

mata. Klebs¹ recognizes an almost pure fibroma and an adenofibroma; while Virchow,² Rosenstirn,³ Monod,⁴ Cornil and Ranvier,⁵ Lannelongue,⁶ Tripier,⁷ Labbé and Coyne,⁸ and other modern investigators describe them merely as fibromata. The vegetating variety, properly denominated cystic fibroma, is equivalent to the papillare drüsengeschwulst⁹ of Foerster, the cystosarcoma fibrosum of Rindfleisch, the fibroma intracanalicular papillare of Virchow, the fibroma endocanalicular of Labbé and Coyne, the cystoid adenoma of Birkett, the true cystic adenocele of Bryant, and the proliferous mammary cyst of Paget.

Circumscribed fibromata are spherical, rounded, or ovoid, and have a nodular, bossed, or lobulated outline. Their consistence is usually firm and elastic, or hard when they are not succulent, or unequal when the fluid contents of the cysts are in excess, in which event they are elastic, or soft and fluctuating over the more prominent bosses, but firm elsewhere. On section they may be dry, white, nacraeous, or opaque-white, dense, and compact, and cry under the knife, and the interlacing bundles of fibrous tissue may be arranged concentrically around centres which project above the level of the cut surfaces. Minute examination of growths which present

¹ *Op. cit.*, pp. 1181 and 1199.

² *Op. cit.*, p. 325.

³ *Virchow's Archiv*, Bd. lvii, p. 163.

⁴ *Arch. Gén.*, ser. 6, vol. xxv, p. 23.

⁵ *Op. cit.*, p. 159.

⁶ *Dict. de Méd. et de Chir. Prat.*, t. xxi, p. 555.

⁷ *Dict. Encyc. des Sciences Méd.*, ser. ii, t. iv, p. 394.

⁸ *Op. cit.*, p. 252.

⁹ *Op. cit.*, p. 544. For the other references to the works contained in this paragraph, consult page 38.

these peculiarities, shows, as in fig. 6,¹ that they are composed of dense bundles of mature fibrous tissue, which is almost or entirely devoid of corpuscles, and that the small projections correspond to acini. This

FIG. 6.



FIBROMA.—New growth of mature connective tissue, with intercalated dilated acini, *a a a*, the epithelial cells of which have undergone irritative hyperplasia. The stained nuclei of the cells alone are shown.

type corresponds, therefore, to the neoplasms formerly called fibroid or desmoid. In other specimens, bands of young, wavy connective tissue interlace in every direction. Such tumors are more or less juicy or moist, and of a glistening whitish, grayish-white, or rosaceous tint, and represent the majority of fibromata. In rapidly growing examples the minute struc-

¹ From a section of a tumor, as large as a walnut, and of fourteen months' duration enucleated from the upper and outer portion of the right mamma of a married and prolific lady forty-two years of age.

ture is that of recent connective tissue abounding in cellular elements.

The smallest vegetating tumors have a lobed appearance, while the macroscopic features of the larger ones vary in accordance with the transformations to which they are liable. Thus, while the mass of the growth may be firm and of a milk-white color, the vegetations are not infrequently softer and more transparent. When they are very vascular, their tint is rosaceous, or decidedly red, or red in lines, or even ecchymotic. A yellowish hue is indicative of fatty changes, while myxomatous degeneration is characterized by areas of gelatinous appearance.

Inflammation and suppuration of fibroma are very uncommon, and fungous protrusion was met with in only three of the fifty cases which I have collected. In an example of intracanalicular tumor, recorded by Gotzmann¹ from the practice of Grohe, incision gave vent to pus, and considerable masses protruded, which gradually sloughed off, and the opening closed. The incised part again opened in eighteen months, and was the seat of obstinate hemorrhage. In the case of Fergusson² there was an immense pouch, which opened on the surface in the form of two lips, the fissure between which was large enough to admit three fingers. In that of Labbé,³ a tumor of nearly thirty-four years' duration had ulcerated during the last two months of its existence, and protruded from a large cyst as a mushroom-like mass of the volume of one-third of a fist. Its surface was red and mam-

¹ *Ueber das Intracanaliculäre Fibrom der Weiblichen Brustdrüse.* Inaug. Disser., Straslund, 1867.

² *Trans. Path. Soc. London*, vol. iv, p. 273.

³ *Op. cit.*, p. 275.

millated, and discharged bloody pus. It is interesting to note, from a diagnostic standpoint, that these were all examples of vegetating growths, and that the skin around the ulcer was normal as respects freedom from infiltration and adhesion to the protruding mass.

The degenerations of fibromata are the cystoid, fatty, myxomatous, osseous, calcareous, and telangiectatic, but they are infrequent. In about 4 per cent. of all examples they may be the seat of cysts, due either to fatty or mucoid transformation of the epithelium of the acini, or to myxomatous change of the connective tissue. In addition to the latter, there may also be fatty metamorphosis, and in this event the growth may contain blood or extravasation cysts. In 6 per cent. of all cases,¹ provided they are of many years' duration, the mineral salts may be interspersed throughout limited portions of the mass, so as to impart to it the appearance of spongy bone; or they may be aggregated into a densely hard concretion, which, as recorded by Cruveilhier, may resemble in size and configuration the head of the femur; or, as in the case of Monteils, they may form plates surrounding the fibrous tissue, some of which contain osteoblasts. Ossification is very uncommon, the only example of that occurrence of which I have any knowledge being one of a true spongy osteoma, as large as a pigeon's egg, contained in a cystic myxomatous fibroma removed by Leloir.²

Although they are, as a rule, only moderately vascular, fibromata undergo telangiectatic transforma-

¹ Cases of Labbé, *op. cit.*, p. 270; Monteils, *Bull. de la Soc. de Chir.*, ser. 3, vol. i, p. 472; and Cruveilhier, *Bull. de la Soc. Anat.*, t. xlviii, p. 344.

² *Gaz. Méd. de Paris*, No. 52, 1878.

tion in one case out of every eight and one-third,¹ which is usually associated with rapid growth, and is indicated in one half of the examples by a bloody discharge from the nipple. In these cases of increased vascularity, which, as well as the calcareous degeneration, appears to be confined to the cystic fibromata, the vegetations are pervaded by large vessels, to the rupture of which may be ascribed the more or less transformed blood that is found in the dilated ducts, and the hemorrhages which occur when they protrude externally.

Fibrous tumors of the mamma are usually solitary. Thus of 50 examples, only 9 were multiple, two or more growths being present in one breast in three, and in both in six. When single they are, for the most part, peripheral, being found in the upper half of the gland and toward its outer side in rather more than three-sixths, above and internally in less than two-sixths, and in the vicinity of the nipple and in the lower segment of the organ in one-sixth of all cases. They are generally quite superficial, and, in rare cases, or once in every sixteen, project beyond the level of the skin as pendulous or pedunculated growths.²

They have been met with as early as the twelfth and as late as the fifty-sixth year, the average age of their first observation being 28·5 years, but they are uncommon before puberty and after the fifth decade. Of the 50 cases,

¹ Cases of Labbé, *op. cit.*, pp. 206, 275, and 397; De Morgan, *Trans. Path. Soc. London*, vol. xxi, p. 352; Cruveilhier, *ut supra*; and Lebreton, *Bull. Soc. Anat.*, t. xliii, p. 282.

² De Morgan, *Trans. Path. Soc. London*, vol. xix, p. 393; Paget, *op. cit.*, p. 564; and Cras, *Bull. et Mém. de la Soc. de Chir.*, t. iii, p. 13.

11 appeared between 10 and 20 years.

18	"	"	20	"	30	"
11	"	"	30	"	40	"
7	"	"	40	"	50	"
3	"	"	50	"	60	"

Of the entire number, 6, or 12 per cent., occurred before the sixteenth year, namely at the ages of 12, 13, 14, 14, 14, and 15, or during the developmental state of the mamma; 34, or 68 per cent., appeared between the sixteenth and fortieth years, or at a period when the breast and the genital organs are functionally most active; and 10, or 20 per cent., after the fortieth year, or during the period of their functional decline. It is, moreover, interesting to note that cystic fibroma develops later in life than the solid variety, since the average age at which the former was first noticed was 36.9 years, against 23.9 years for the latter. Hence it may be said that non-vegetating fibromata, which represent six-tenths of the entire number, are essentially outgrowths of the young and active mamma, while vegetating fibromata are outgrowths of the mature gland.

Nineteen of the patients were single when the tumor was first observed, and twenty-two were married, while the social condition is not stated in nine. Of the married women, thirteen had more than one, and five had one child, but four of these had never suckled; two were barren; and the question of children is not mentioned in two. In two the disease developed during lactation.

Of thirty-three cases, in which the menstrual function is recorded, thirty were regular, two were irregular, and one was the subject of metrorrhagia. Two

of the patients after the fiftieth year were menstruating, while of the young subjects it is certain that the catamenia had appeared in one at the age of fourteen. Assuming, in the remaining five and in one woman of fifty-six years, that the menses had either not appeared or had ceased, it is evident that fibromata are developed principally during the menstrual epoch of life, since it is not shown in a single instance that they appeared after the menopause. These facts, when considered in connection with the statements concerning the social condition of the patients, demonstrate conclusively that neither celibacy nor disordered nor arrested menstruation is an important agent in their production.

In only six instances, or one in every eight and one-third, was the tumor traceable to injury, while in none did it appear to be inherited. The general health of the patients was, as a rule, excellent.

The growth of fibromata is slower than that of the other connective tissue tumors, but it is very variable, and seems to be influenced by the presence or absence of vegetations. Of the solid variety, the smallest that I have met with attained a diameter of half an inch, and a thickness of three eighths of an inch, in twelve months, and a personal experience with eleven cases shows that they rarely exceed the volume of a large walnut in three years. Even at the end of ten years they may be limited to that size,¹ or measure only three inches in diameter in eighteen years.² A breadth of an inch and three quarters in six months is the most rapid growth that I have witnessed. The

¹ Labbé et Coyne, *op. cit.*, p. 388.

² Muriel, *Trans. Path. Soc. London*, vol. viii, p. 384.

largest examples that I find recorded were of the size of a goose's egg in four years;¹ or measured nearly twelve inches in length, and weighed seven pounds in twelve years;² or had a circumference of twenty-two inches, and weighed four pounds in twenty years;³ or attained the volume of two fists, and weighed upward of twelve pounds in twenty-one years.⁴ On the whole, the rate of their growth may be computed at about two-thirds of an inch a year.

Cystic fibromata increase more quickly and acquire a larger size, as a rule, than the preceding variety. While it is true that they may require twelve months to reach the volume of a small chestnut,⁵ or six months,⁶ eighteen months,⁷ two,⁸ three,⁹ and even four years,¹⁰ to attain the dimensions of a hen's egg, they grow, on the other hand, to the size of a double fist or foetal head in two years and a half¹¹ or six years,¹² of an adult head in one year¹³ or twenty-five years,¹⁴ or have a circumference of twenty-nine inches, and weigh eight pounds in six years,¹⁵ or weigh twenty-nine pounds in seven years.¹⁶ A peculiarity of their growth is that, while they may have been stationary or have progressed slowly for a long time, they suddenly, and without obvious cause, begin to

¹ Schub, *Chirurgie und Operationslehre*, p. 311.

² Paget, *op. cit.*, p. 564.

³ Monteils, *Bull. de la Soc. de Chir.*, ser. 3, t. i, p. 472.

⁴ Cras, *Bull. et Mém. de la Soc. de Chir.*, vol. iii, p. 13.

⁵ Labbé et Coyne, *op. cit.*, p. 397.

⁶⁻¹⁰ *Ibid.*, pp. 448, 190, 131, 403, and 264.

¹¹ Demarquay, *Bull. de la Soc. Anat.*, t. xliii, p. 492. Paris, 1868.

¹² Labbé et Coyne, *op. cit.*, p. 259.

¹³ Lebreton, *ante*.

¹⁴ Labbé et Coyne, *op. cit.*, p. 270.

¹⁵ De Morgan, *Trans. Path. Soc. Lond.*, vol. xxi, p. 352.

¹⁶ Gherini, *Annali Univ. di Med.*, Feb., 1878.

increase rapidly, so that a nodule that has remained of the size of a walnut for five years and a half reaches the volume of a double fist in six months,¹ or a tumor which has taken twenty-four years to equal the size of an orange attains that of an adult head, and weighs nearly six pounds in an additional year.² Under these circumstances the neoplasm will be found to be very vascular, or contain blood-cysts, or a large quantity of fluid. Hence the mode of increase is of importance as an aid in the diagnosis of the variety of fibroma, a slowly and regularly growing tumor indicating freedom from cysts and vegetations, and a suddenly and rapidly increasing tumor, with decided enlargement of its bosses, indicating the accumulation of fluid contents and intracanalicular vegetations.

It now and then happens that fibromata grow very rapidly during pregnancy, as in the case reported by Cras, while, in about six per cent. of all examples, they become larger during the menstrual discharge and subside at its termination.³ In one case the tumor became harder and fuller just before the appearance of the menses, but returned to its former consistence and volume when the flow was established.⁴ In an instance recorded by Fergusson,⁵ it increased very rapidly after the menopause; while, in a unique example reported by De Morgan,⁶ the breast suddenly doubled its size during a severe attack of gout in the toe, but returned to its original dimensions with the disappearance of the disease.

¹ Labbé et Coyne, *op. cit.*, p. 259.

² *Ibid.*, p. 270.

³ *Ibid.*; De Morgan, *ante*; and Muriel, *ante*.

⁴ Labbé et Coyne, *op. cit.*, p. 190.

⁵ *Ante*.

⁶ *Ante*.

Throughout their entire life, as a rule, the skin remains mobile and normal in texture and color; the subcutaneous veins are not enlarged; the nipple is natural; the neighboring lymphatic glands are not involved; and the tumors are free from superficial or deep attachments.

To these general statements there are some exceptions. In two cases the skin was adherent, but to a limited extent only in one; in two it was red, and in one of these, at points, almost purple; while in three, as has been already mentioned, it ulcerated. The superficial veins were tortuous and dilated in three. The nipple was depressed in two. In one the neoplasm was so closely connected with the outer border of the pectoral muscle that some of its fibres had to be removed with it; while in another it adhered firmly, by two prolongations, to the periosteum of the sternum. In not a single instance were the lymphatic glands enlarged.

In about one case out of every seven of cystic fibromata there is a discharge from the nipple, but this symptom does not appear to be present in the solid form of fibrous tumor. In an example recorded by Labbé,¹ a spontaneous, although scanty, escape of a whitish fluid preceded the detection of the new growth by two months, when it became bloody. In a patient under the care of Guyon,² a sanguinolent discharge was induced by pressure upon the breast, but it had ceased for several years before the tumor was extirpated. In a third case,³ there were several hemorrhages by the nipple during the rapid increase of the tumor, or during the last month of its exist-

¹ *Op. cit.*, p. 397.

² *Ibid.*, p. 206.

³ Lebreton, *ante*.

ence. In all of these examples the cysts were more or less completely filled with highly vascular vegetations, so that a bloody discharge is indicative of that condition.

Fibrous tumors of the breast are by no means indolent, since, of 41 cases in which pain is referred to, that symptom was present in 24, or 58·5 per cent., while it was absent in 17. Attention was, however, first called to the affection by suffering in only 2 of the entire number, while in the remainder it declared itself after the discovery of the tumor. In 13, or rather more than one-half, the pain was of an intermittent, severe shooting, darting, lancinating, or neuralgic character, while in 11 it was slight and evanescent, usually darting, but not infrequently dull and aching. In 6 it did not appear until the tumor began to increase rapidly; in 2 it was experienced only at the menstrual period; in 2 it grew worse at that time, and in 1 during lactation; while in 1 the pain was aggravated after the cessation of the catamenia. In the examples of ulceration of the skin and fungous protrusion, the suffering was slight; in one, indeed, there was no pain at all, but the mass was exquisitely tender on handling. Including this case, only five were sensitive. In one of my own, a tumor not larger than a bean was, for the last three months of its existence, as intolerant of manipulation as a painful subcutaneous tubercle. It had existed for one year in the right mamma of a prolific female, aged forty-two, from whose left breast a similar growth was removed six years previously in Saxe-Weimar. In three examples the pain and tenderness were so great as to occasion what is known as the irritable

tumor of the breast, and in none of these did the growth exceed the volume of a small walnut. Hence, while it is true that amyelenic neuromata occur in the mamma, as has been demonstrated by Tripier¹ in two instances, it is highly probable that the small growths which excite so much suffering are composed essentially of indurated fibrous tissue.

Recurrence of fibromata is met with rather more than once in every sixteen cases. Thus, Notta² enucleated a calcifying vegetating tumor of twenty-five years' duration, as large as an adult head, and weighing five pounds, from the breast of a prolific woman of fifty-two. At the expiration of six months she detected a new growth, of the volume of a walnut, at the cicatrix, which, in three months, had attained the size of a child's head. As it soon ceased to increase, and as it caused no pain, she declined further interference. De Morgan³ excised a fibrous tumor as large as an egg from a woman twenty-two years of age. Another growth made its appearance in twelve months, which, in six years, when it was removed, had acquired the volume of a small coconut, and was pendulous. It was a coarse fibroma with withered ducts. In a remarkable case, recorded by Rosenstirn,⁴ a tumor of one year's standing, and seated in the left mamma of a prolific woman of forty-five, was enucleated in April, 1855. In March, 1860, a growth of six months' duration was removed from the right breast. Four additional tumors were

¹ *Dict. Encyclop. des Sciences Médicales*, ser. 2, t. iv, p. 408.

² Labbé et Coyne, *op. cit.*, p. 270.

³ *Trans. Path. Soc., London*, vol. xix, p. 393.

⁴ *Virchow's Archiv*, Bd. lvii, p. 166.

extirpated from the left mamma in March, 1861, August, 1862, August, 1866, and September, 1869, and two from the right breast in 1862 and 1869. They were all traversed by enlarged and deformed ducts.

These illustrations of recurrence do not denote local malignity, but merely indicate that, in some women, there is a tendency to the formation of multiple fibrous growths, so that in these cases it was a question either of the further development of a nodule which was overlooked at the time of operation, or of the successive appearance of similar tumors in portions of the gland that remained behind. In all of these examples the growths were simply enucleated; but even when the gland has apparently been entirely removed, it need not excite surprise if fibromata subsequently make their appearance, since outstanding lobules are sometimes disseminated throughout the entire mammary region, and even in the axilla, and may readily escape the eye of the surgeon.

Other evidences of the innocent nature of fibromata are the absence of enlargement of the associated lymphatic glands and of secondary deposits in the viscera. Their benignity is, moreover, demonstrated by the facts that they had existed, on an average, for five years and eight months before they were subjected to the knife, and that the total duration of life from their first observation to the date of the final reports averaged fourteen years.

Although they are not malignant, fibromata may, in their open and fungating state, prove destructive to life through profuse suppuration and hemorrhage, or through the injurious effects exerted upon neigh-

boring organs. Thus, Foerster¹ describes a solid tumor, eleven inches long, eight broad, and four inches and a half in thickness, which produced absorption of a portion of the seventh rib, and penetrated the thorax, where, covered by the pleura, it formed a mass seven inches long, five broad, and three inches and a half thick, which rested upon the diaphragm, pushed the lung upward and completely compressed its lower lobe, dislocated the heart to the right, and curved the vertebral column to the opposite side.

The diagnosis of fibromata is based upon their indolent and insidious origin, their great mobility, peripheral situation, firm consistence, lobulated outline, slow growth, moderate dimensions for the period of their existence, freedom from alterations in the skin, nipple, subcutaneous veins, and lymphatic glands, slight liability to ulcerate and fungate, and to a discharge from the nipple, tendency to be painful during their progress, and upon their greatest frequency between the sixteenth and thirty-fifth years, or, on an average, at the twenty-eighth year.

The distinction between the solid and cystic varieties may be made by attention to the following points: The former appear, on an average, at the twenty-third year; twenty-one per cent. develop before the age of sixteen, and seventy-five per cent. before the thirtieth year. They are uniformly firm or hard, never fungate, nor are they marked by a bloody discharge from the nipple. The latter are never seen before the sixteenth year; occur, on an average, at the thirty-sixth year; and only thirty-five per cent. originate before the age of thirty. Their consistence

¹ *Op. cit.*, Bd. ii, p. 481.

is unequal, being firm at points, and soft and fluctuating at others; they are more largely and deeply lobulated, fungate once in every seven cases, and discharge by the nipple in an equal proportion of instances. Their growth is, moreover, sudden and rapid after having remained stationary, or advanced slowly, for several years.

CHAPTER VI.

SARCOMA.

OF the neoplasms of the breast there is none about which so little was known up to a comparatively recent period as that denominated sarcoma. Indeed, even at the present day, it is included among other growths by practical surgeons. The term itself has no histological significance, having been employed by Abernethy to designate a tumor "having a firm and fleshy feel"; but it is now used to indicate a new formation, which has its physiological type in embryonic tissue, and is composed of the undeveloped cells of the connective tissue series, separated by intercellular substance. From the excessive preponderance and grouping of the cells, which endow it with its peculiar characters, and from their indisposition to develop into higher tissues, they constitute a structure which is unlike any mature tissue, and may, therefore, be regarded as an atypical connective tissue production, just as carcinoma is an atypical epithelial growth.

The histogenesis of sarcoma is very simple. In consequence of the irritation to which they are subjected, the endothelial cells of the connective tissue stroma of the mamma proliferate, and they, along with the emigrant colorless blood corpuscles, the fat

cells, and, it may be, the endothelium of the smaller vessels, are converted into an embryonic mass; this mass forms the indifferent, small-celled, or granulation tissue, which constitutes the starting-point of nearly all neoplasms. In addition to these nutritive disturbances, there is a new growth of vessels, so that there results a structure similar to that of granulations, out of which, through changes in the morphology of the cells and the character of the intercellular substance, the varieties of sarcoma originate. Hence, it will be seen, that the textural modifications are the same, primarily, as those witnessed in ordinary granulation tissue.

The varieties of sarcoma are determined by the prevailing form of the cells, while certain subdivisions are constituted by the nature of the intercellular substance, which may be hyaline, granular, fibrillated, lymphoid, or alveolar, and by various transformations, as the myxomatous, fatty, telangiectatic, cystoid, and calcareous, the latter of which will be considered under the degenerations to which these tumors are liable. In accordance with the dimensions of the cells, they are, moreover, separated into the small-celled and the large-celled.

1. ROUND-CELLED SARCOMA.—The structure of round-celled sarcoma, which is equivalent to the embryoplastic tumor of Robin, the medullary sarcoma of Müller, the granulation sarcoma of Billroth, and the encephaloid sarcoma of Cornil and Ranvier, is usually composed mainly, as is seen in fig. 7,¹ of fra-

¹ From a section of a tumor, of twelve months' duration, which had invaded two-thirds of the right mamma of a spinster forty-two years of age. Its consistence was firm and elastic, except at a spot as large as a silver dollar, where

gile spherical cells, of the size of lymph corpuscles, and provided, as a rule, with a single round or ovoid nucleus, which is large when compared with the pro-

FIG. 7.



SMALL ROUND-CELLED SARCOMA.—*a*, Transverse section of a duct, partially filled with hyperplastic epithelium, *c*, and limited by its membrana propria, *b*, the endothelial cells of which are very apparent. *c c*, and *d*, Transverse sections of vessels with embryonic walls. *f*, Longitudinal cut of a vessel.

toplasm of the cell, and held together by a scanty, soft, amorphous, dimly granular, or finely fibrillated intercellular substance. Numerous large but delicate vessels pervade the tissue, and are very liable to rupture. From these general features there are some histological variations whereby certain subdivisions are constituted.

a. Lymphoid Sarcoma.—When the intercellular substance forms a delicate reticulum of hyaline fibres, the meshes of which are occupied by a single cell, as

it was somewhat soft, and the skin was tense and livid. The nipple and axillary glands were normal, and there were no adhesions to the chest. The cut surface of the growth had a translucent, grayish look; was interspersed, here and there, with points of extravasated blood; and was the seat of two softening cysts beneath the discolored integument. Despite the fact that I removed the entire breast, with its coverings and the pectoral fascia, recurrence ensued in two months, or before cicatrization was completed.

in fig. 8,¹ so that the structure resembles the cyto-genous or adenoid tissue of the lymph follicles, the tumor is known as lymphoid or lymphadenoid sarcoma.

FIG. 8.



RETICULATED TISSUE OF A LYMPHOID SARCOMA, PERVADED, HERE AND THERE, BY BANDS OF VASCULAR, DELICATE, WAVY, FIBROUS TISSUE.—The meshes are occupied by cells which are shrunk from the hardening process to which the tumor was subjected. With the exception of a few dilated ducts, the glandular elements had disappeared.

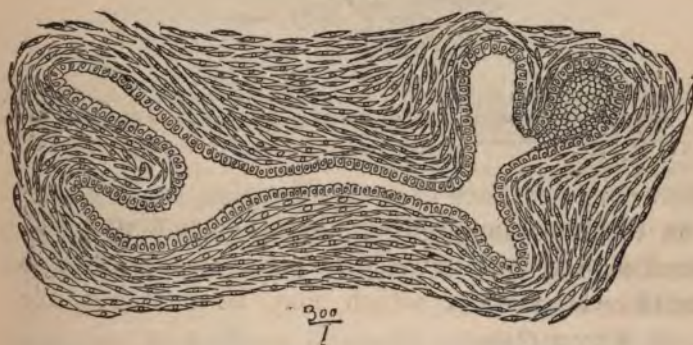
β. Alveolar Sarcoma.—A still greater departure from the ordinary type is occasionally met with, the cells being contained within the alveoli of a connective tissue meshwork, through which it bears a close resemblance to carcinoma, but from which it differs, first, by the cells being intimately connected with the walls of the alveoli or the vessels which form the alveoli; and, secondly, by the existence of a reticulated intercellular substance, like that seen in the preceding variety. In other words, the stroma and cells are intimately interwoven into a single tissue; while, in carcinoma, they are easily separable into two distinct tissues.²

¹ From a lobulated, elastic, mobile growth, of three months' duration, which I enucleated from the upper and outer border of the left mamma of a single woman twenty-two years of age. It had a diameter of an inch and a half, and its tolerably firm section had a rosaceous-gray tint.

² Compare with my paper on Sarcoma of the Long Bones, *Amer. Jour. Med. Sciences*, October, 1879, p. 347.

2. SPINDLE-CELLED SARCOMA.—Spindle-celled sarcoma, which is synonymous with the fasciculated carcinoma of Müller, the albuminous sarcoma of Gluge, the fibronucleated tumor of Bennett, the recurrent fibroid tumor of Paget, the fibroplastic tumor of Lebert, the plasmoma of Follin, and the fasciculated sarcoma of Cornil and Ranvier, has its pathological prototype in recent cicatrices, and is made up of fusi-

FIG. 9.



SMALL SPINDLE-CELLED SARCOMA.—Showing the spindle-celled tissue surrounding a longitudinal section of a dilated duct, with its terminal acini, which are lined by low columnar epithelium. One of the acini is filled with hyperplastic epithelium.

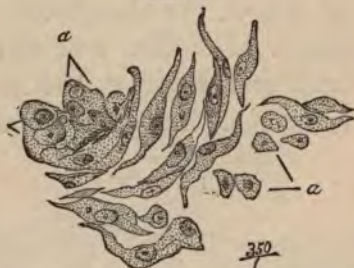
form cells, which vary greatly in size, as is shown in figs. 9¹ and 10,² although they are usually small, that is to say, short and narrow, and provided with a single ovoid nucleus. The intercellular substance is generally very scanty, and the tapering extremities

¹ From a section of the tumor delineated in fig. 12.

² From the margin of a section of a tumor, of less than two months' standing, removed, along with the entire breast, by Dr. C. B. Nancrede, from a married and prolific woman thirty-five years of age. The skin was discolored, and false fluctuation was so distinct that it had been punctured a few days previously under the supposition that it was an abscess. The tissue was almost diffuent and highly vascular.

of one cell are received between the bellies of two contiguous cells, forming a tissue which is composed of bands or fasciculi of closely aggregated cells;

FIG. 10.



LARGE SPINDLE-CELLED SARCOMA. *a a a*, Transverse sections of spindle cells. The cells are all highly granular, and vary in form without departing materially from the usual shape.

these cells interlace in every direction, so that a section discloses longitudinal, oblique, and transverse bundles, the last of which may be mistaken for round or oval cells.

3. GIANT-CELLED SARCOMA. — Myeloid, or giant-celled, sarcoma, is composed, as is seen in fig. 11,¹ of large multinucleated elements, imbedded usually in a stroma of spindle and round cells, with the intervention of little, if any, visible intercellular substance. The tissue has, therefore, an apparently alveolar construction, which is the more striking when the cells have undergone mucoid softening, or are obscured by advanced fatty changes.

Apart from distention of the ducts, which gives rise to cystic sarcoma, the glandular structure of the mamma persists, to a greater or a lesser extent, in only

¹ From a section of a tumor of the head of the tibia, which I have recorded in the *Amer. Jour. Med. Sciences*, July, 1879, p. 29. The figure is introduced here for purposes of comparison.

about one-third of all specimens of sarcoma, and then principally in the spindle-celled growths which are denominated adenoid sarcomata, and which rarely at-

FIG. 11.



GIANT-CELLED SARCOMA.—Showing the characteristic multinucleated elements contained in a stroma of spindle cells, transverse sections of which are seen at the upper corner to the right of the figure.

tain a considerable volume before their removal. In none of the specimens which I have examined did the endothelial cells of the membrana propria participate in the proliferation, so that that structure remained intact, although it may be thickened, or, as more frequently happens, attenuated. Labbé and Coyne,¹ however, state that it may disappear entirely, and that the epithelial cells then rest upon the spindle elements of the tumor; but this statement appears to me to have arisen from a misinterpretation of the picture, since in the normal state the innermost boundary of the proper membrane consists of a subepithelial layer of parallel spindle cells, which always enlarge when the acini or ducts are dilated as the result of the morbid changes going on around them.

¹ *Op. cit.*, p. 291.

Mucoid transformation of the matrix, fatty infiltration of the cells, increased vascularization, the deposition of the earthy salts in the intercellular substance, and the persistence of the remains of the preëxisting connective tissue of the mamma, constitute the subdivisions of sarcoma known as the myxomatous, lipomatous, telangiectatic, calcifying, and fibrous, so that these terms may be employed as prefixes to denote the nature of the changes that have ensued, or designate the existence of certain subordinate tissues. The term cystic is employed to indicate dilatation of the ducts, while cystoid is prefixed to the tumor when it is the seat of softening cysts.

Of the varieties of sarcoma the spindle-celled is by far the most common,¹ as it constituted eleven of the sixteen cases² that have come under my personal observation, and was met with in forty-five of the sixty examples that I have collated to illustrate the pathology of the affection. Lancereaux³ records an example of giant-celled tumor, and myeloid elements were present in considerable numbers in a specimen of recurrent round-celled sarcoma which I exhibited at the Pathological Society,⁴ and they were also found in a recurrent spindle-celled growth by Haward.⁵ Of the subdivisions the most common is the cystic, as

¹ Virchow, *op. cit.*, p. 355, and Rindfleisch, *op. cit.*, p. 545, regard the round-celled as being the most common.

² Of the eleven spindle-celled, five were small, firm, adenoid growths; one was a telangiectatic and myxomatous, and one a myxomatous medullary sarcoma; four were firm cystic, and in one of these the cysts were filled with vegetations. Of the five round-celled, one was lymphoid; one was a myxomatous cystic medullary growth; two were vegetating, and one of these was medullary; and one was a cystoid medullary tumor.

³ *Bull. de la Soc. Anat.*, ser. 2, t. v, p. 292.

⁴ *Phila. Med. Times*, vol. ix, p. 283.

⁵ *Trans. Clin. Soc. of London*, vol. vii, p. 106.

nearly six-tenths of all sarcomata of the breast are of that nature. Next in point of frequency are the myxomatous and telangiectatic; after which come the fibrous, cystoid, and calcifying. The lymphoid is so uncommon that I am not aware of any other example than my own. The alveolar, as far as I know, has been only seen as a recurrent growth, while the melanotic is unheard of.

Like the other encapsuled neoplasms of the mamma, circumscribed sarcomata are ovoid, rounded, or spherical, lobed or bossed, and seldom smooth and uniform, the surface irregularities being most marked in the cystic variety. As a rule they are unattached to the gland, but push it aside, compress, and flatten it, or cause it to atrophy, although they are, in rare instances, united to it by a pedicle. Their consistence varies with their minute structure and degenerations, the pure spindle-celled tumors being firm, like fibromata, while the round-celled are soft and elastic. The former, however, are soft in about one-third of all examples, when they will be found to be composed of small fusiform cells, or to have undergone myxomatous or fatty transformation, or to be the seat of interstitial hemorrhage. The latter are hard in about one-fourth of all cases, when they will usually be found to be rich in fibrous intercellular substance. In one of the best illustrations of round-celled tumors that I have ever seen, the tissue was dense, so that they are by no means synonymous with soft, medullary; or encephaloid sarcomata, although they are usually much softer than the spindle-celled variety, since they are peculiarly rich in cells and bloodvessels, and since their intercellular substance is usually mucoid.

The spindle-celled growths sometimes creak or cry under the knife, in which event they come under the category of fibrous sarcomata, from the large admixture of fibrous tissue. Their consistence varies, moreover, with their stage of development. If they are solid, it is entirely or almost uniform; while they are soft and elastic, or soft and fluctuating at some points, and especially at the larger bosses, and hard at others, when they are the seat of cysts occupied by fluid, or solid contents, or by both. In about one-fourth of the cystic growths, however, the tumor is firm throughout, in consequence of the cysts being so deeply seated as to elude detection by manipulation.

On section the spindle-celled tumors are usually smooth, succulent, and glistening, and of a white or grayish-white color, particularly if they are poor in vessels, the tint being rosaceous-white or rosaceous-gray when their vascular supply is larger. The round-celled tumors, on the other hand, are rarely pure white, but, from their relatively greater vascularity, reddish-white, reddish-yellow, or reddish-gray, the hue being not infrequently comparable to that of the foetal brain. When they are highly vascular the rosaceous tint is very marked, or they are pervaded by macroscopic vessels; or dotted with minute spots of ecchymosis, or patches or streaks of bright red or brown, or various intermediate shades of pigmentation. In not a few instances the soft brain-like tissue is so extensively interspersed with clots of blood, and with cysts containing blood, that the term hematoid sarcoma is not inappropriately applied to them, or the term fungus hematodes when they protrude through the skin. A pronounced yellowish color indicates

fatty metamorphosis, which may pervade almost the entire tumor, or be confined to limited areas or to the vegetations alone, while the remainder is white or gray, thereby imparting to it a mottled aspect. A yellowish tint also denotes myxomatous changes, so that, as in the former instance, the mass of the growth may be white or rosaceous-white or rosaceous-gray, and the vegetations be yellow. On the whole, however, gelatinous spots dotting the surface of the section are the best characteristic of this change. Now and then, or when great vascularity and the fatty and myxomatous degenerations are combined, there will be areas of yellow and red, and spots of brown pigmentation, along with gelatinous dots. In point of fact the color is so variable that it is extremely difficult to give an intelligible description of it. The cut surfaces of many of the largest specimens have also a lobed appearance from the close packing of the vegetations in the enlarged ducts which play the part of capsules.

The gross characters of the smaller tumors, which correspond to the adenoid sarcomata of Billroth, and which do not grow larger than a walnut in seven or eight months, are worthy of notice, as they differ from fibromata of the same dimensions in several particulars that are useful in establishing a differential diagnosis. Thus, of the five specimens of spindle-celled growths which I have extirpated, all were lobulated, firm, elastic, adherent to the gland, grayish-white in color, and tough on section. The fibromata, on the other hand, were hard, merely nodular, less adherent to the mamma, white, and more compact and tough on section. Under the microscope, the glan-

dular elements were undergoing obliteration to a greater extent in the former than in the latter.

Inflammation and suppuration of mammary sarcoma are infrequent, but ulceration of the overlying tissues and fungous protrusion are so common that they occurred in fifteen of the sixty cases that I have collated, a proportion which is four times greater than is met with in fibroma. As is witnessed in the latter tumor, the ulceration appears to be the result rather of inflammation and gangrene of the attenuated skin than of its infiltration by sarcomatous cells; but in one case it depended upon exploratory puncture. Fungous protrusion almost invariably follows the perforation of the integuments, although in a remarkable instance recorded by Ashhurst,¹ the recurrent growth of which I exhibited at the Pathological Society, the ulcer subsequently healed. The protruding mass varies in size from a hazel-nut to three, four, and even five inches in diameter, and exhales a sanguinolent and fetid discharge, which may become more or less purulent from inflammation induced by exposure and friction. It is not, however, very liable to free hemorrhage or sloughing, as the former accident was observed in only three instances, and the latter in one. The ulcer itself is usually circular, and the surrounding skin is not only, as a rule, free from discoloration, but it is also unattached to the fungus, and everted, or rather elevated, on its sides. Now and then there are several ulcers, separated by bridges of sound tissue. From a diagnostic standpoint, it is worthy of notice that ulceration occurred in three out of twenty-five, or

¹ *Trans. Path. Soc. Phila.*, vol. v, p. 230.

12 per cent., of solid sarcomata, against twelve out of thirty-five, or 34 per cent., of cystic sarcomata, and that it was rather more frequent in the round-celled than in the spindle-celled growths.

The metamorphoses of sarcomata are the myxomatous, fatty, telangiectatic, cystoid, and calcareous. They usually begin in their centre, which may be quite soft and broken down, while the periphery is unchanged. Myxomatous degeneration is met with in 18·5 per cent. of all cases, being most common in the spindle-celled and cystic, and, along with fatty changes, is the most frequent cause of the large interstitial hemorrhages to which these tumors are liable. Although sarcomata are more vascular than the other neoplasms of the breast, they are only excessively so in 18·5 per cent. of all cases, in which event they are liable to be converted, in great part, into a dark-red, grumous, pultaceous material; and the dilated ducts often contain sanguinolent fluid, or even pure blood. In such cases minute examination discloses very numerous vessels, the adventitia of which is infiltrated with round cells undergoing fatty degeneration, through which they lose their power of resistance, become varicose and dilated, finally give way, and emit a large quantity of their contents. Cystoid changes, due either to fatty or mucoid transformation of the glandular epithelium, or to fatty changes of the sarcomatous cells, are met with in about 10 per cent. of all instances, the former being the more common, and almost peculiar to solid sarcomata. These glandular and softening cysts must not, however, be confounded with the cysts which arise from ectasia of the ducts, and which constitute true cystic

sarcoma. The contents of the false cysts may be yellowish, lactescent, mucoid, or gelatinous. The cavities are rarely of large dimensions, although they may give rise to extensive areas of diffuent, broken-down tissue, and may be associated with extravasations of blood. Calcareous degeneration is less common than in fibroma, as it was noticed in only two instances, or in 3.3 per cent., of all cases, in one of which cretaceous plates were found in the walls of a duct cyst, and in the second of which the mineral salts were interspersed throughout a limited portion of the tumor. Billroth¹ refers to a large cystic sarcoma which contained plates of bone, but ossification was not met with in the cases that I have collated, nor were any characterized by the presence of cartilage, although Coats² describes a specimen of sarcomatous chondro-fibroma.

Sarcomata of the breast are generally solitary, since I find of sixty cases that only six were multiple, several growths existing in the same gland in five, and in both in one. Their most common seat is beneath, or in the vicinity of, the nipple, and, when they arise from the circumference of the organ, they are usually found at its upper and inner side. When of central origin they are, for the most part, cystic; while they are usually solid when they start from outlying lobules. In either event they evince a marked disposition to extend beyond the limit of their capsules, those of central origin gradually invading the entire gland, and the surrounding soft parts, while the peripheral ones not only infect the latter struc-

¹ *Virchow's Archiv*, Bd. xviii, p. 59.

² *Glasgow Med. Jour.*, Nov., 1871, p. 45.

tures, but also finally implicate the entire breast. As a rule they give rise to broadly based hemispherical tumors, but they are now and then pedunculated.

They occur as early as the fourteenth and as late as the sixty-fourth year, the average age of their first observation being 35·5 years. Of the 60 cases,

8 appeared between 10 and 20 years.					
10	"	"	20	"	30
23	"	"	30	"	40
13	"	"	40	"	50
4	"	"	50	"	60
2	"	"	60	"	70

Of the entire number only one, or 1·66 per cent., occurred before the sixteenth year, or during the developmental state of the mamma; 40, or 66·66 per cent., appeared between the sixteenth and fortieth years, or at a period when the breast and genitalia are functionally most active; and 19, or 31·66 per cent., after the fortieth year, or during the period of their functional decline. Spindle-celled tumors develop earlier in life than the round-celled, since the average age at which forty-five examples of the former were noticed was 32·6 years, against 42·4 years for fifteen cases of the latter. Unlike cystic and solid fibromata, cystic sarcomata appear at an earlier age than solid sarcomata, the average for thirty-five instances of the cystic being 33·7 years, against 37 years for twenty-five examples of the solid variety. Hence it may be said that, while sarcomata and fibromata are both outgrowths of the active mamma, spindle-celled and cystic sarcomata are metaplasias of the functionally perfect mamma, and round-celled and solid sarcomata are metaplasias of the declining gland.

In point of fact, a sarcoma occurring before the age of twenty is liable to be a spindle-celled tumor in seven-eighths of all cases.

Fifteen of the patients were single and twenty-six were married when the tumor was first noticed, while the social condition is not noted in the remainder. Of the married women sixteen were multiparous, three had one child, and four were barren; while the question of children is not stated in three. In one case the disease showed itself during pregnancy, in four soon after parturition, and in one three years after the menopause. Of twenty-four subjects in which the menstrual function is recorded, all were regular, and the youngest patient, a girl of fourteen, was menstruating. In only eight instances, or one in every seven and a half, was injury assigned as the cause of the tumor; in one it developed at the site of an abscess; in one it was preceded by psoriasis of the nipple; while in none was it inherited. These facts show that the etiology of sarcomata is most obscure, since their development is rarely traceable to injury or disease, and is not influenced by hereditary predisposition, while the social state and menstrual irregularities or arrest are surely unimportant agents in their production.

The increase of sarcomata is more rapid than that of fibromata and myxomata, but it is liable to great diversity, being independent of the age of the subject, and influenced by their structure, by their degenerations, and by the absence or presence of cysts. Of the solid sarcomata I have met with six examples which varied from one to two inches in diameter in five, six, seven, and eight months; and, even at the

end of two or three years, they may not be larger than an apricot¹ or a turkey's egg,² although they may, in their pure state, attain the volume of an adult head in four months,³ or a circumference of twenty-five inches and a weight of four pounds and two-thirds in nine months.⁴ When they are the seat of myxomatous degeneration or of softening cysts, they may weigh four pounds and twelve ounces,⁵ or measure twenty-three inches in circumference and weigh six pounds, in four months.⁶ Of the cystic, as of the solid, variety, I have seen examples in which it did not exceed a diameter of two inches in five and eight months; while it is rarely larger than a fist in one year. In exceptional instances, however, it may attain a weight of upward of ten pounds in the same number of months,⁷ or a circumference of thirty-one inches and a weight of twelve pounds in one year.⁸ As an evidence of its unequal rate of progress, we may state that it may require eighteen months⁹ or five years¹⁰ to reach the volume of a foetal head, or six years¹¹ or fifteen years¹² to attain the size of an adult head.

Like the cystic fibromata, sarcomata may remain stationary and of small dimensions for a long time,

¹ Reverdin, *Bull. de la Soc. Anat.*, t. xlii, p. 708, and t. xliv, p. 285.

² Zambianchi, *Ibid.*, t. xlv, p. 314.

³ Billroth, *Chir. Klinik*, Wien, 1869-'70, p. 142.

⁴ Bryant, *Trans. Path. Soc. London*, vol. xix, p. 387.

⁵ Bennett, *Cancerous and Cancroid Growths*, pp. 12 and 256.

⁶ Hewson, *Gross's System of Surgery*, 5th ed., vol. ii, p. 985.

⁷ Glück, *Langenbeck's Archiv*, Bd. viii, Jahresbericht, p. 599.

⁸ Pitha, *Ibid.*, p. 599.

⁹ Hubert, *Bull. de la Soc. Anat.*, t. xlviii, p. 690.

¹⁰ Reverdin, *Ibid.*, t. xlv, p. 281.

¹¹ Hubert, *Ibid.*, t. xlviii, p. 389.

¹² Berbèze, *Ibid.*, t. xli, p. 94.

when, without obvious cause, they suddenly begin to increase, so that a nodule that has required fifteen years to attain the volume of a walnut reaches that of a double fist in three months;¹ or one that has been quiescent and of the size of a walnut for twenty-five years, suddenly begins to grow, and measures eighteen inches transversely by fourteen inches and a half vertically in three years;² or one that has been a year and a half in acquiring the volume of an egg grows to a circumference of twenty-six inches, and a weight of seven pounds in an additional six months.³ In such cases rapid accumulation of fluid and solid contents in the dilated ducts may be looked for, with the addition, probably, of myxomatous changes and interstitial hemorrhage, as in the case from which fig. 12 was taken. Under similar circumstances their progress may be interrupted, of which a notable example is recorded by Robin,⁴ in which a vegetating myxomatous spindle-celled tumor remained of the size of a hazel-nut for six years, when it grew continuously for four years, and reached the volume of a fist, and then doubled its size in three years and a half, and during the last six months, or fourteen years from its first appearance, attained a weight of nine pounds. Intermision of growth is not infrequent in sarcoma, and is of diagnostic value when compared with the progress of other neoplasms of the breast. As occurs in fibroma, continuous growth rather indicates freedom from cysts and vegetations, while sudden and rapid

¹ Marignac, *Bull. de la Soc. Anat.*, t. lii, p. 428.

² Anderson, *Trans. Path. Soc. Lond.*, vol. xxiii, p. 254.

³ Marchand, *Gaz. des Hôpitaux*, No. 51, 1869, p. 196.

⁴ *Journal de l'Anat. et de Phys.*, t. x, p. 195, and *Bull. de la Soc. Anat.*, t. xlviii, p. 817.

increase points to fluid accumulation and intracanalicular vegetations.

The growth of sarcomata might naturally be expected to be connected with menstruation, pregnancy,

FIG. 12.¹

MYXOMATOUS AND TELANGIECTATIC CYSTIC SMALL SPINDLE-CELLED SARCOMA.

or lactation, or with conditions which render the mammary gland more vascular; but the influence of

¹ Myxomatous, telangiectatic, cystic, spindle-celled sarcoma, the minute features of which are represented in fig. 9. A young and single lady, twenty-four years of age, first noticed, seven years previously, or a few months after the establishment of menstruation, a lump, as large as a hickory-nut, just above and

an increased flow of blood to the organ, which has been assumed by certain authors, is not confirmed by an analysis of the cases that I have collected. Thus, in only two examples¹ was an increase in bulk witnessed at the menstrual period, while in one the tumor became smaller,² and in two the rapid growth began at the menopause.³

From these considerations it follows that, while sarcomata constitute the most bulky of the mammary neoplasms,⁴ their growth is so capricious that an average rate of increase cannot be assigned to them.

to the outside of the right nipple, which slowly increased until, at the end of six years, it was of the volume of the fist. It then began to grow rapidly, and measured, at the time of operation, twenty inches in circumference, or twelve inches and a half transversely and vertically, against seven and five inches for the opposite breast. The subcutaneous veins were only slightly enlarged; the nipple was buried in a crescentic fold; the skin was everywhere mobile and of normal tint, except above over a large boss, where, for two square inches, it was adherent, attenuated, of a bluish tint, and pervaded by minute vessels; the outline of the breast was smooth and regular, except above, where it was bossed; the gland was freely mobile on the chest; the temperature was five degrees higher than that of the opposite breast; and the axillary glands were not involved. Throughout its entire course, the tumor was absolutely painless. The patient's menses were regular; there was no history of trauma or heredity; but both nipples had been the seat of psoriasis ever since she could remember, and she frequently picked off the crusts.

After removal by Professor Gross, in May, 1879, the breast weighed nearly three pounds. On section, there was an escape of a bloody fluid, and the cut surfaces were of a dark-red color, and interspersed, here and there, with dilated ducts, a few of which contained delicate vegetations. Above, and corresponding with the altered integument, there was a large softening cyst, occupied by fluid blood. Below the remains of the gland were seen to be flattened and spread out. The neoplasm itself was surrounded by a capsule. The patient was free from a return ten months after the operation.

¹ Cases of Hubert and Kirmisson, *Bull. de la Soc. Anat.*, t. xlviii, p. 389, and t. xlix, p. 457.

² Pitres, *Ibid.*, t. xlviii, p. 706.

³ Cases of Monod and Bordier, *Ibid.*, t. li, p. 581, and t. xxxix, p. 96.

⁴ In his inaugural dissertation, *Ueber Fibro-Adenom der Mamma*, Göttingen, 1878, p. 13, Dr. Watson narrates a case from the practice of Dr. Kremer, in which the tumor weighed twenty-two pounds.

On the whole, however, one is justified in concluding that the small-celled, the cystic, the myxomatous, and the telangiectatic increase more rapidly than the large-celled, the solid, and the pure tumors.

The active growth of sarcomata is liable to be attended with marked elevation of the temperature, as was noted in the case detailed in the foregoing footnote, and in one of my own cases, in which Seguin's surface thermometer indicated 100° against 95° for the opposite breast. In two other examples of cystic sarcoma there was an increase in the heat, as roughly estimated by the hand. All of these tumors were highly vascular and composed of small cells, so that elevation of the temperature may be said to be characteristic of telangiectatic and rapidly proliferating growths. Further investigations in this direction may prove useful in determining the differential diagnosis of the connective tissue neoplasms, and should not be neglected.

During their further progress sarcomata continue, as a rule, mobile and free from superficial or deep attachments; the skin remains natural in color and texture; the subcutaneous veins are not enlarged; the nipple is normal; and the associated lymphatic glands are not contaminated. To these general statements some exceptions must be noted.

a. While it is not uncommon for recurrent tumors to be more or less closely attached to the pectoral muscle, and through it to the walls of the chest, it is a singular fact that the primary growth is, almost without exception, freely movable, and unattached even to the common integument. In a case recorded by *Zambianchi*, and it was an example of two growths

in the same breast, the outlying tumor developed over the upper costal cartilages to which it adhered, and sent a prolongation into the thorax.¹ In six instances the neoplasms were slightly adherent to the skin, and in two of these the attachment was in the immediate vicinity of ulcers.

β. Although the skin may be stretched and attenuated, and ulcerated, as I showed in one-fourth of all examples, it was discolored in only sixteen, or in 26·6 per cent., and it is interesting to know that the changes in tint occurred twelve times in the cystic and four times in solid growths which were the seat of degeneration-cysts. In eight it was slightly red, in four bluish, in two intensely red, in one violaceous, and in one livid.

γ. The superficial veins were enlarged in eleven instances, or in 18·3 per cent., but only to a slight extent in two. In nine the tumor was cystic, and in two it was solid, but in the latter it was the seat of extravasation of blood in one, and of mucoid cysts in the second.

δ. The nipple was retracted in only two, and these were examples of cystic growths.

ε. In one case of ulcerated, spindle-celled, cystic sarcoma,² the glands of the axilla were slightly tender and enlarged, as the result of irritation; and, in another instance, an enlarged gland, which was also

¹ *Ante*. Lagrange and Duret (*Bull. de la Soc. Anat.*, t. xlviii, p. 516) refer to a case in which, on post-mortem examination of a female who had for many years an enormous sarcoma of the breast, the tumor separated the fibres of the pectoral muscles, passed between two ribs into the cavity of the mediastinum, and penetrated between and compressed the lobes of the lung without infecting any of these structures.

² Birkett, *Trans. Path. Soc. London*, vol. xx, p. 357.

devoid of tumor elements, was removed along with a recurrent, fungating, spindle-celled tumor.¹ This immunity of the glands from contamination is remarkable, and is a valuable sign in the differential diagnosis of malignant mammary growths.

A discharge from the nipple occurs in one case out of every seven of cystic sarcomata, the proportion being almost precisely the same as is met with in cystic fibromata, and is of great value as a symptom of enlargement of the ducts, although it is of itself unimportant in the differential diagnosis. In an instance from the practice of Bryant,² a viscid discharge was the first symptom, and preceded the detection of the tumor by two years. When it recurred the suffering diminished, and it was sanguinolent just before the removal of the breast, or eight years from the first appearance of the growth. In a second case, recorded by that surgeon,³ the flow was bloody, and derived from highly vascular vegetations. In the case of Hubert,⁴ the tumor augmented in size at each menstrual period, when there was an occasional discharge of a citron-colored liquid. In that of Billroth,⁵ in which the neoplasm developed during pregnancy, there was an occasional escape of a serous fluid; while in the case of Lebert,⁶ in which the growth appeared three months after parturition, a viscid, transparent liquid was expelled by pressure.

Contrary to the usual statements, the growth of

¹ Anderson, *Trans. Path. Soc. London*, vol. xxiii, p. 254.

² *Guy's Hospital Reports*, ser. 3, vol. x, p. 115.

³ *Ibid.*, p. 120.

⁴ *Bull. de la Soc. Anat.*, t. xlviii, p. 389.

⁵ *Chir. Klinik*, Wien, 1869-'70, p. 142.

⁶ *Physiologie Pathologique*, t. ii, p. 128.

sarcomata is attended with pain, since, of forty-one cases in which that symptom is noted, it was present in twenty-six, or 63·4 per cent., while it was entirely absent in fifteen, or 36·6 per cent. In only two examples, however, was attention first called to the tumor by suffering, and, in the remainder, it declared itself later, and varied in character and frequency in accordance with the variety of the sarcoma. Thus, in the solid form it was experienced in only 30 per cent. of the cases, and was merely of an occasional pricking nature. In the cystic variety, on the other hand, it was felt in 78 per cent. of the cases, and in three-fourths of these it came on late in the disease, especially during rapid growth, when the tumor became tense through the increase of the contents of the cysts, and it was of a severe and lancinating character. In 20 per cent. of these cases it was only experienced when ulceration had set in, although ulceration and fungous protrusion did not sensibly affect the suffering, since it was not augmented by these conditions in 60 per cent., while it was entirely absent in 20 per cent. of all examples. In one instance it was felt only at the menstrual periods; while in two it was aggravated, and in one diminished, at that period. In only one case was the growth absolutely tender, although in many examples it was annoying from its weight and bulk.

During their further progress, as we have already seen, sarcomata may invade their limiting capsules and the neighboring tissues, and finally ulcerate. Without, however, of necessity pursuing this course, their capsules may remain intact, but none the less may they extend to the adjacent structures along the

course of the bloodvessels, the adventitia of which is frequently the seat of small-celled proliferation, through which the tissues are converted into "latent zones of infection"; these zones are not appreciable by the naked eye, but serve not only as the points of departure of the recurrences that are so often witnessed after their removal, but also as foci of general infection with the production of deposits in the internal organs. Hence it is that the prognosis of sarcomata is eminently unfavorable, although there is still no little diversity of opinion among practical surgeons and pathologists on this point. Thus, Wilks and Moxon,¹ Cornil and Ranvier,² Labbé and Coyne,³ and Erichsen⁴ regard them, and particularly the cystic form, as being comparatively innocent, and only marked by a tendency to local reproduction. Labbé and Coyne and Erichsen deny the possibility of the general dissemination of spindle-celled tumors; and Erichsen, indeed, advances the singular doctrine that "the tendency to recurrence will in most cases gradually wear itself out, and after several operations have been required at intervals of months, or a year or two, the disease will cease to be reproduced, and a cure will be thus established"; although, he adds, that "instances are not wanting in which the tendency to the local reproduction of the sarcoma has been so active that it outran all possibility of complete extirpation, and eventually destroyed the patient." Virchow⁵ states that, while sarcoma may recur in loco, "it is a tumor of limited malignity, but

¹ *Lectures on Path. Anatomy*, p. 584, 1875.

² *Op. cit.*, p. 1162.

³ *Op. cit.*, p. 431.

⁴ *The Science and Art of Surgery*, p. 565. Phil., 1878.

⁵ *Op. cit.*, p. 362.

fully capable of producing metastases"; and Lücke¹ indorses this view. Birkett,² Gross,³ Ashhurst,⁴ Klebs,⁵ and Billroth,⁶ on the other hand, fully recognize the malignant attributes of sarcomata as denoted by their capability of reproducing themselves, not only in the neighboring tissues, but also in remote parts; and other writers regard their progress as being "much more favorable" than that of mammary carcinoma.

With the view of clearing up the obscurity which exists in regard to the prognosis of sarcoma of the mammary gland, I have carefully studied the cases in which the histories are complete, relying entirely upon the sixty examples which afford the basis of this chapter, and which have been collated without selection. Dividing them, in accordance with their structure, I find

First. Round-celled tumors, whether solid or cystic, or whether they pursue a natural course, or be subjected to operation, are excessively malignant. Thus, in a case recorded by Billroth,⁷ a sarcoma of the left breast of a pregnant woman, aged thirty-one years, was succeeded, in four months, by a similar growth in the opposite mamma. She was not interfered with, and during the last few weeks suffered from continued fever, cough, and expectoration, and

¹ Pitha and Billroth's *Hdbch. der Allg. und Spec. Chir.*, Bd. ii, Abth. i, p. 194.

² *Holmes's System of Surgery*, 2d ed., vol. v, p. 269.

³ *System of Surgery*, 5th ed., vol. ii, p. 984.

⁴ *Phila. Med. Times*, vol. ix, p. 384, 1879.

⁵ *Op. cit.*, p. 1118.

⁶ *Surgical Pathology*, by Hackley, p. 606; and *Pitha and Billroth's Hdbch.*, Bd. iii, Abth. ii, Lief. i, p. 97.

⁷ *Chir. Klinik*, Wien, 1869-1870, p. 142.

died in seven months from the first observation of the disease. An inspection of the body could not be obtained; but the chest symptoms pointed to secondary tumors in the lungs.

If the patient survives an operation, recurrence may be looked for. Thus, of ten instances, local or general reproduction was witnessed in eight, five of which occurred within half a year, one in fifteen months, one in three years, and one in five years, the average date having been not quite eighteen months. A patient of my own died with a recurrent growth in nine months after the removal of the primary tumor, but without metastatic deposits, the total duration of life having been thirty-three months;¹ one died after two recurrences and a supposed secondary growth pressing upon the sciatic nerve, in the short period of nine months from the commencement of the disease;² one died of a round-celled sarcoma of the cerebellum three years after the extirpation of the breast;³ one died, in twenty-seven months, of secondary tumors in the left lung, having in the meanwhile been subjected to five operations;⁴ while one succumbed from scirrhus of the opposite breast, in two years and a half, without recurrence.⁵ One patient was living at the end of thirty-one months, having undergone two operations for recurrence;⁶ one was alive eleven months subsequently, but had submitted to three additional operations, and declined

¹ *Phila. Med. Times*, vol. ix, p. 383.

² Hewson, *Gross's Surgery*, 5th ed., vol. ii, p. 985.

³ Edes, *Amer. Jour. Med. Sciences*, vol. lxi, p. 90.

⁴ Kramer, *Watson's Inaug. Diss.*, ante, p. 13.

⁵ De Morgan, *Trans. Path. Soc. Lond.*, vol. xix, p. 394.

⁶ Gerin-Rose, *Bull. de la Soc. Anat.*, vol. xxxiii, p. 211.

further interference for a fourth recurrence;¹ one was living, with a large recurrent growth, four months after the removal of the breast;² one underwent another operation at the expiration of five years;³ while one was living ten months subsequently without recurrence.⁴ It will thus be seen that, of ten patients who submitted to operation, in only two was there no evidence of local reproduction or general dissemination; but, as recurrence may be delayed for five years, these cases prove nothing, since one died of another affection in two years and a half, and one was alive, free from disease, at the end of ten months.

Secondly. The prognosis of spindle-celled sarcomata is scarcely more favorable. Thus, of sixteen examples, one was living, free from disease, several months,⁵ one six months,⁶ one fifteen months,⁷ one twenty-six months,⁸ and one five years after operation, the subject of the last case suffering from enlargement of the axillary glands, "which soon proved to be due to cancerous deposit."⁹ In the remaining eleven there was local or general recurrence, which appeared, on an average, in thirteen months. One was alive at the end of nine years, five recurrent growths having been removed in that period; but the case was recorded immediately after the last opera-

¹ Gerin-Rose, *Bull. de la Soc. Anat.*, vol. xxxiii, p. 281.

² Billroth, *Virchow's Archiv*, Bd. xviii, p. 69.

³ Kuester, *Langenbeck's Archiv*, Bd. xii, p. 619.

⁴ *Ibid.*

⁵ Reverdin, *Bull. de la Soc. Anat.*, t. xlv, p. 281.

⁶ Lefort, *Gaz. des Hôpitaux*, No. 51, 1869, p. 196.

⁷ Gross, *System of Surgery*, 5th ed., vol. ii, p. 986.

⁸ Billroth, *Chir. Klinik*, Wien, 1869-'70, p. 142.

⁹ Pick, *Trans. Path. Soc. London*, vol. xx, p. 347.

tion;¹ one was alive at the end of fourteen months after the removal of a recurrent growth of six months' standing, but this case also was reported soon after the operation;² one had just submitted to the removal of a recurrent growth at the expiration of thirty-two months;³ one was living with a seventh recurrence at the end of ten years, six tumors having been removed in the meantime;⁴ and one underwent twenty-two operations for fifty-one recurrent growths in four years, and was perfectly well for upward of ten years subsequently, so that the patient may be regarded as having been cured.⁵ Of the six that died, in one the disease returned in three weeks, and again recurred one week after its removal; but the patient succumbed at her home, so that there was no post-mortem inspection;⁶ in one there was recurrence in less than six weeks, and a second tumor appeared after its extirpation; but the woman died of exhaustion, and there were no metastatic deposits, although the tumor extended into the chest;⁷ in one there were three recurrences in thirteen years, and, on death from the effects of the last operation, the tumor was found to have projected slightly into the pleural cavity, but the viscera were healthy;⁸ in one there was recurrence in fourteen weeks, and, on death without operation in two months, the tumor

¹ Gay, *Trans. Path. Soc. London*, vol. xvi, p. 240; vol. xx, p. 359; and vol. xxv, p. 233.

² Herpin, *Bull. de la Soc. Anat.*, t. xlix, p. 633.

³ Neftel and Howard, *The Medical Record*, vol. iv, p. 356, and vol. viii, p. 15.

⁴ Heath, *British Med. Journal*, vol. i, 1878, p. 194.

⁵ Gross, *Op. cit.*, vol. ii, p. 985.

⁶ Anderson, *Trans. Path. Soc. London*, vol. xxiii, p. 254.

⁷ Nunn, *Ibid.*, vol. xviii, p. 255, and vol. xix, p. 380.

⁸ Haward, *Trans. Clin. Soc. London*, vol. viii, p. 107.

was found to have perforated the chest, and there were metastatic deposits in the lungs, mediastinum, liver, ribs, vertebræ, pelvic bones, dura mater, and sphenoid bone;¹ in one a secondary growth developed in the right thigh at the end of two months, and on death, eleven months subsequently, another voluminous tumor was found in the left thigh, but a post-mortem examination could not be obtained;² and, finally, one died of metastatic tumor of the brain and parietal bone, of twenty-three months' duration, two years and a half after the removal of the breast.³

From the preceding facts it appears that the case which ran a natural course, and which was an illustration of symmetrical disease, proved fatal, with presumed secondary deposits, in seven months from the time the growth was first observed; while, of the twenty-six that were subjected to operation, six were living free from disease for an average period of two years; one died without evidences of local or general infection; and nineteen were examples of local return or dissemination. Of these nineteen, nine had had one or more recurrences, and were still alive at the date of the reports; four died with recurrence, but without metastases; one died with recurrence and supposed visceral implication; two died with both local and general tumors; and three died of metastases, but without local reproduction. It is, moreover, interesting to note that recurrence was met with just as frequently after the entire removal of the breast as after partial operations, and that it was

¹ Virchow, *Virchow's Archiv*, Bd. ix, p. 618.

² Bennett, *Cancerous and Cancroid Growths*, pp. 12 and 256.

³ Volkmann, *Bemerkungen über einige von Krebs zu trennende Geschwülste*, p. 32.

certainly due to local infection in all except possibly one, in which multiplicity of the original growth may have denoted the further development of nodules which escaped observation at the first enucleation.

While it is naturally impossible to say what course the disease subsequently pursued in the patients in whom there were no signs of recurrence for two years after operation, it is not unreasonable to suppose that it proved infectious, either locally or generally, in some of the cases, and the termination cannot be doubted in those who were living with recurrent tumors. Be this as it may, the fact remains that mammary sarcoma recurs locally in 61·53 per cent. of all instances, and that it gives rise to secondary deposits in distant organs in 57·14 per cent., since local reproduction was met with in sixteen out of twenty-six cases, and metastatic tumors were discovered in four out of seven post-mortem examinations.

While sarcoma recurs less frequently and not so rapidly as carcinoma, it is more liable to visceral complications than is the latter. As we have just seen, 61·53 per cent. of the sarcomata are locally infectious; while, as will be pointed out in the chapter on that affection, carcinoma reproduces itself in 80·97 per cent. of all instances. Of twelve cases of sarcoma in which the date is noted, eight, or 66 per cent., developed again in less than one year, or in a period which varied from three weeks to eight months; while the others appeared, respectively, in fifteen, eighteen, thirty-two, and sixty months. In carcinoma, on the other hand, 88·35 per cent. of the local recurrences are met with in the first year. Inspection after death discloses metastatic tumors in 57·14 per cent. of the

sarcomata, against 50 per cent. of the carcinomata; and presumed metastases are more frequent by 3 per cent. in the former than in the latter. Hence, sarcoma is less infectious locally, but more infectious as regards the general system, than carcinoma. Its more relatively benign character is, moreover, shown by the fact that the average duration of life, from the first observation of the disease to the date of the last report after removal, is seven years, against thirty-seven months for carcinoma; and this contrast becomes the more striking when it is stated that the majority of the sarcomatous patients were still living, while the majority of the carcinomatous subjects were dead. Not only is this statement true for all sarcomata, but it holds good for the two principal varieties, since the average life for round-celled sarcoma is four years, and seven years and a half for the spindle-celled.

Although the recurrent regional disease is more intense than the primary, and other reproductions generally follow in quick succession, there can be no doubt that the removal of the tumors, as fast as they appear, alleviates suffering, prolongs life, and averts visceral contamination. Thus Gay enucleated from the same breast two cystic growths, both of which recurred and were removed with the entire gland in eighteen months. They appeared again and were extirpated in thirty months; and a third and single recurrent tumor was excised in five years, so that life was prolonged for nine years, or for fifteen years from the first appearance of the disease up to the date of the last report. In Heath's case there were seven recurrences in thirteen years, but the last was not subjected to operation. In that of Haward, the

primary growth was excised in 1860, and recurrent growths were removed in 1863, 1869, and 1873. The patient died from the effects of the last operation, but life was prolonged, as in the preceding instance, for thirteen years. The case of Gross, however, is, as far as I know, the most remarkable on record. In March, 1857, a single woman, aged forty-four, discovered a small tumor in the left breast, which was enucleated the following October. During the next sixteen months two more partial operations were performed; and a fourth tumor, along with the entire breast, was extirpated in May, 1859. In three months and a half the knife was again required, and soon afterward other tumors were removed. In 1860 she underwent eleven operations, and six in 1861, the last of which was performed in September of that year, so that she was subjected to twenty-two operations in four years. The number of recurrent tumors was fifty-one, and they varied in size from an almond to a hen's egg. They appeared at or near the cicatrices within a few weeks, and rapidly assumed a fungating aspect. Large portions of the pectoral, and also of the external and internal intercostal muscles, were cut away, so that during a deep inspiration there was a slight protrusion of the pleura. Ten years and nine months after the last operation she was in perfect health. In these four cases the tumors were composed of spindle cells; there was no lymphatic involvement, and the general health was unimpaired.

The prognosis is materially influenced by the age of the patient and by the size and rate of increase of the tumor. Thus in young persons, or before the age of thirty-five, when the gland is functionally most

active, a small, slowly growing sarcoma does not return, while a rapidly increasing cystic tumor is very liable to recur. Among the latter class of cases, 66 per cent. of the tumors recurred, and 33 per cent. remained well. After the thirty-fifth year, on the other hand, and the danger increases with advancing age, the greater is the liability to metastases, as in this class of cases 33 per cent. were generalized, 40 per cent. recurred, and 27 per cent. remained free from disease.

The prognosis is also influenced by the histological constitution of the tumor and the stage of its evolution. Of the spindle-celled 56.25 per cent. recurred, and 18.75 per cent. gave rise to metastatic growths; of the round-celled 70 per cent. recurred, and 30 per cent. were generalized; of the cystic 53.3 recurred, and 13.3 per cent. were disseminated; while, of the solid, 55.5 per cent. recurred, and 22.2 were generalized. Hence, while the round-celled are to be regarded as the most pernicious, the metastasis of the spindle-celled is by no means to be denied; nor can one say, with Erichsen, that the cystic variety tends to wear itself out by repeated operations, since it recurs almost as frequently as the solid variety, although the latter reproduces itself in distant parts in 9 per cent. more of the cases. These investigations demonstrate that the usual statements, which are so opposed to the actual facts, as to the malignity of sarcomata, are due either to their not having been based upon a careful analysis of recorded cases, confirmed by minute examination, or to the confounding of cystic sarcomata with cystic fibromata, which never infect the economy.

The diagnosis of small, slowly increasing fibrous sarcomata is by no means always easy, as they are very liable to be confounded with fibromata, particularly when they arise at the circumference of the mamma. A tumor, however, of soft, elastic, apparently fluctuating consistence, which attains the volume of an adult head in a few months, can scarcely be anything else than a small-celled sarcoma. On the whole, the diagnosis is based upon their indolent origin, mobility, central situation, elastic, or unequal consistence, lobulated outline, rapid increase, large dimensions for the period of their existence, freedom from lymphatic involvement, their marked tendency to ulcerate, the not infrequent discoloration of the skin and enlargement of the subcutaneous veins, and possibly elevation of temperature; upon the suffering which they awaken late in the disease; and upon their greatest frequency after the thirty-fifth year.

Between the solid and cystic varieties there are certain distinctions, which are useful in establishing a differential diagnosis. The former develop at about the thirty-seventh year; the skin is discolored in 16 per cent., and adherent in 12 per cent.; the veins are dilated in 8 per cent.; there is no discharge from the nipple, nor is it retracted; pain is met with in 30 per cent., but it is slight; the tumor ulcerates in 12 per cent., and it is characterized by malignant features in 77 per cent. of all instances. Cystic sarcoma starts at the thirty-third year; it grows more rapidly than the solid variety, and its increase is often sudden after having remained stationary or advanced slowly for some time. Now and then, after evacuation of the fluid of the superficial cysts, their solid contents

can be detected by manipulation; their consistence is, as a rule, unequal, and they are more largely lobulated than the former variety. The skin is discolored in 34 per cent., being of a bluish tint in one-third of all cases over the most prominent cysts, and it is adherent in 11 per cent.; the veins are enlarged in 25 per cent.; the nipple is retracted in 5·71 per cent., and discharges fluid in 14·28 per cent.; ulceration occurs in 34·28 per cent.; pain is experienced in 78 per cent., and it is usually harassing; while the disease is malignant in 64 per cent. of all cases.

CHAPTER VII.

MYXOMA.

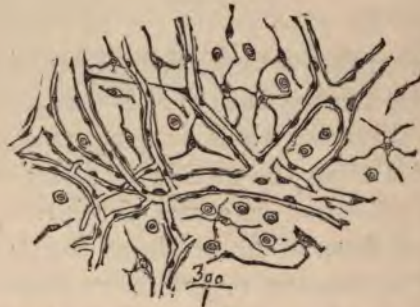
OF the connective tissue neoplasms of the mammary gland by far the most rare is that denominated myxoma by Virchow, which is synonymous with the collonema of Müller, the gelatinous sarcoma of Rokitsky, the net-celled sarcoma of Billroth, the soft and succulent form of fibrocellular tumor of Paget, and the colloid, mucous, or gelatinous tumor of other pathologists. Rindfleisch briefly describes it as cysto-sarcoma mucosum; and Birkett refers to it as colloid growth; but the history of its life is lost in that of colloid carcinoma. I have myself never met with it, although I recently examined a specimen removed by my friend, Dr. J. M. Barton; and, after careful research, I have been able to collect only ten examples, confirmed by minute inspection.

In structure, pure or hyaline myxoma has its physiological prototype in the soft rudimentary connective tissue and enamel organ of the foetus, in the Whartonian jelly of the umbilical cord, and in the adult vitreous body. It consists, as is represented in fig. 13,¹ of a meshwork of vessels, the spaces between

¹ From a section of a recurrent tumor, of fifteen months' duration, and as large as an egg, removed, with the breast, by Dr. Barton, from a single woman, in whom the primary disease developed at the age of fifty-five, or seven years after the

which are filled with a mucous substance beset with round and oval, but more especially with spindle and stellate cells, from which numerous filamentous and anastomosing processes or prolongations are given off. Tumors thus constituted have a translucent greenish, yellowish, or yellowish-gray color, are of soft, jelly-

FIG. 13.



HYALINE MYXOMA.—Showing the characteristic anastomosing stellate and spindle cells, as well as round cells, which are contained in the meshes of a vascular network. The nuclei in the walls of the vessels are very apparent.

like consistence, and yield, on pressure or scraping, a clear, sticky, viscid, or filamentous fluid, similar to a solution of gum-arabic, and exhibiting the chemical characters of mucin.

From this simple type of structure there are certain deviations, through which are constituted the following varieties:

a. Medullary Myxoma.—When the cells, which, compared with the intercellular substance, are usu-

menopause. It was soft and pseudofluctuating; the skin, to a limited extent, was adherent, and had a bluish tint; but there were no deep attachments or other complications. On section, the cut surfaces were of a dark-red color, and yielded, on pressure, a viscid fluid. The entire tumor was inclosed in a delicate capsule, which, however, was broken through by a subcutaneous fungus; this corresponded to, but did not perforate, the thinned and discolored skin.

ally few in number, proliferate and preponderate either throughout the entire mass or at localized points, and the tissue has a whitish, opaque, or even an encephaloid, appearance, the term medullary is prefixed to the growth.

β. *Lipomatous Myxoma*.—When, on the other hand, without having necessarily multiplied, the cells are converted into fat cells, and the gelatinous material contains firmer areas of a yellow, yellowish-white, or brownish-white tint, the tumor is known as lipomatous myxoma.

γ. *Fibrous Myxoma*.—If the mucoid intercellular substance is pervaded by rather abundant ordinary connective tissue and elastic fibres in the form of delicate bands or meshes, the neoplasm is converted into a fibrous myxoma, which has a grayish or whitish tint, is tolerably firm, and is not unlike cedematous areolar fibroma.

δ. *Cystoid Myxoma*.—If, as occasionally happens, the cells themselves undergo mucoid transformation and disintegrate, and the matrix liquefies, cystoid spaces filled with less consistent mucoid fluid result, and change the growth into a cystoid myxoma.

ε. *Telangiectatic Myxoma*.—Any of these varieties may become so vascular through the new formation of vessels as to constitute telangiectatic myxoma, or, in the event of the rupture of the delicate and enlarged vessels and interstitial bleeding, hemorrhagic myxoma. These occurrences are denoted by the rosaceous, red, dark-red, or brownish-red discoloration, and even by vessels which are visible to the naked eye.

Hyaline myxoma is not common. Of seven examples in which the minute features are described,

one was hyaline, and one was hyaline and hemorrhagic; two were lipomatous, and two telangiectatic and lipomatous; while one was fibrous and telangiectatic. Hence the fatty and vascular varieties constitute the majority.

Like the other histoid neoplasms, myxoma originates in the interlobular and intertubular connective tissue, which, from being dense and resisting, reverts to its rudimentary or mucous state. Just how often the adipose tissue of the gland serves as its starting-point, it is, of course, impossible to say; but a case recorded by Moore, in which a portion of the tumor consisted of almost pure fat, appears to favor the idea that the primary growth was of that nature, and that the fat cells had returned to their embryonic condition.

The entire mamma may be converted into a bulky mass, or one or more lobules may alone be concerned in the tumor formation, thereby constituting diffused and lobular, or circumscribed, myxomata. The latter are the more frequent, as limited portions of the gland were affected in six of the ten instances¹ which I have collated. In one of these, as occurs also in fibroma and sarcoma, the growth, which was as large as an orange, displaced the gland backward, but was attached to it by a pedicle of the thickness of two fingers. In the remainder, the tumor was merely encapsuled, without being fixed to the mamma. In both forms the lacteal glands usually disappear; but

¹ The cases are recorded by De Morgan, *Trans. Path. Soc. London*, vol. ix, p. 360; Cooke, *Ibid.*, vol. xix, p. 398; Pean, *De La Fibromyome*, p. 41, and *Ligons de Clinique Chir.*, p. 478; Laddé and Ogma, *op. cit.*, pp. 322 and 326; Moore, *Dublin Journ. of Med. Science*, vol. lxxx, p. 489; Virchow, *op. cit.*, p. 427; Cocull and Saxvier, *op. cit.*, p. 1162; and Barton, *ibid.*

in one-half of all examples the dilated ducts are filled with vegetations, and constitute the intracanalicular variety of myxoma.

Mucous tumors are solitary, round, or ovoid, occasionally lobulated, and are usually seated in the upper hemisphere of the breast, and toward its outer periphery. They are quite liable to inflammation, ulceration, and fungous protrusion, as those accidents were met with in three of the seven examples in which the histories are complete. In one of Pean's cases, the tumor, which had existed for fourteen years in a woman aged fifty-five, had been the seat of a superficial abscess for six weeks. In one described by Labbé and Coyne, the intracanalicular growth protruded through an opening in the skin in the form of a bleeding black mass, and was the seat of occasional slight hemorrhage. In this instance the ulceration was due to specific infiltration of the skin, as the papillæ were much enlarged, and composed of myxomatous tissue. In the case of telangiectatic lipomatous tumor, recorded by Moore, ulceration ensued in five years, and the patient nearly bled to death. During the last twelve months of its existence, it bled at each menstrual period, and the hemorrhage was quite profuse one month before its removal, after which it discharged gelatinous material.

Myxomata develop as early as the twenty-ninth and as late as the fifty-sixth year, the average being the forty-sixth year. Of 7 cases,

0 appeared between 10 and 20 years.					
1	"	"	20	"	30
0	"	"	30	"	40
4	"	"	40	"	50
2	"	"	50	"	60

Hence, as sixth-sevenths of the entire number appear during the functional decline of the mamma, their evolution, like that of carcinoma, is intimately connected with the period of obsolescence of the breast, or when the glandular structure is disappearing and the fibrous and fatty constituents predominate.

Three of the women, of whom one was sterile and two were multiparous, were married, and one was single, the social condition not being noted in the remainder. In one the tumor appeared seven years after the menopause, which occurred at the age of forty-seven; in one at the seventh month of the first pregnancy, and the menses were regular; while in one the catamenia were irregular at the age of forty-nine. In not a single instance was the manifestation of the growth referable to trauma or heredity.

Myxomata increase more rapidly than fibromata, but less swiftly than sarcomata, although their volume is never so great as is met with in those neoplasms. Even when the entire gland is involved, it is unusual for them to attain the size of a child's head, as in the tumor depicted by Virchow. In a general way it may be said that they grow rapidly, since, with the exception of one which had acquired the volume of a walnut in six months, none are recorded of less size than an apple or an orange within the first year of their existence, while one measured three inches and a half by two inches and a quarter in that time. In the case of Moore a weight of upward of five pounds was reached in six years.

While they evince no disposition whatever to extend to the deeper structures, they invade the skin

in five-eighths of all instances, as was shown by its positive infiltration in two cases, and by discoloration and adhesion in three. Among these five examples ulceration had also occurred in two. Enlargement, without however induration, of the associated lymphatic glands was observed in only one of the eight cases in which the symptoms are detailed, but, as they were not interfered with, and as the further history of the case after operation is incomplete, it is impossible to say what changes they had undergone.

Of the natural course of myxoma, nothing is known, as all the cases were subjected to the knife. Of eight examples, in which there are more or less finished accounts, one died from the effects of the operation, the tumor having existed for one year; one was well two months subsequently, and the growth was of twelve months' duration; two were well, without recurrence, at the end, respectively, of eighteen and twenty-six months; one recurred in fifteen months, and was still living three years and a half from the first appearance of the disease; while three were devoid of further histories, but in these the disease had existed, respectively, six months, six years, and fourteen years before removal. In these eight examples the duration of life, from the first observation of the disease until its termination in recovery or death, varied from six months to fourteen years, and averaged forty-five months. Excluding the cases in which the history terminates with recovery from operation, there was one recurrence out of three operations. Hence, it may be said that myxomata are tumors of limited malignity, as they recur in 33 per

cent. of all instances, but do not occasion metastatic deposits.¹

The clinical features of mucous tumor are by no means characteristic. The great softness and frequent sensation of fluctuation, which distinguish it in other situations, and through which it is liable to be confounded with fatty and cystic growths, are absent in the majority of cases in this locality. Of the five examples in which the consistence is noted, in only two was it soft; in one it simulated a cyst with thickened walls, or had a doughy feel circumscribed by a firmer sensation; while in two it was more or less hard. In three-eighths of all instances the skin is adherent and discolored, while in one-fourth it is ulcerated. The axillary glands are enlarged in one

¹ As has just been stated, myxoma of the mammary gland, although it recurs after operation in one-third of all instances, does not extend to the walls of the chest, or occasion metastatic tumors of the viscera. The paramammary form, or that which starts in the coverings of the gland, is eminently malignant. Thus, Virchow¹ records one which developed upon the breast from a wart at the side of the nipple at the age of nineteen, and, in two years, formed a polypoid tumor of the volume of an infant's fist; but further details are wanting. Of the four that started in the subcutaneous fat, that of Neumann² recurred twice, and the pectoral muscle was the seat of small tubers; that of Pean³ recurred four times, and the axillary glands were voluminous, but the patient remained well ten months after the last operation; that of Forster⁴ invaded the mamma and recurred in two months, and, on death eight weeks later, the muscles of the chest were involved, but the viscera were sound; while in that of Morris⁵ there was one recurrence, and, on death in eighteen months from the first observation of the disease, the posterior part of the right lobe of the liver was found to be transformed into a myxomatous mass, as large as a fœtal head at full term, which invaded the base of the contiguous lung. Hence, of the four cases of paramammary myxoma, in which there is a further history after operation, all recurred, and one reproduced itself in the liver.

¹ *Op. cit.*, p. 419.

² *Virchow's Archiv*, Bd. xxiv, p. 316.

³ *Leçons*, etc., *ante*, p. 478.

⁴ *Trans. Path. Soc. London*, vol. xxiii, p. 260, and *Guy's Hosp. Reps.*, ser. 3, vol. xviii, p. 48.

⁵ *Ibid.*, vol. xxiii, p. 274, and vol. xxiv, p. 120.

case out of every eight, but the nipple and veins are normal, and the tumor is mobile on the chest. In four-sevenths of the cases the patient experiences pain, which will be found to be slight in one, and lancinating, although intermittent, in three.

Some of these signs, when considered in connection with the mature age at which the growth usually develops, tend to render the diagnosis most obscure. Thus, in the case of De Morgan, which occurred at the age of fifty-six, the enlarged axillary glands, slightly adherent skin, and firm feel of the tumor caused it to simulate carcinoma.

On the whole, a solitary, rapidly and continuously growing, although not bulky, round or ovoid, painful, soft, or rather firm tumor, with limited attachment to the skin, but movable on the deeper structures, with a tendency to ulcerate, and, it may be, to discharge a gelatinous material, but unattended with enlargement of the glands or superficial veins, or retraction of, or discharge from, the nipple, and occurring at about the forty-sixth year, may be assumed to be a myxoma.

CHAPTER VIII.

ADENOMA.

IN speaking of the connective tissue neoplasms, I drew attention to the fact that the glandular apparatus of the mamma was liable to undergo certain changes, such as enlargement of the acini and irritative hyperplasia of the epithelium, which so thoroughly impressed the older writers with the idea that they were the essential elements as to lead them to regard the tumors in which they were found as being composed of glands of new formation, and to lose sight of the stroma as their possible matricular tissue. Hence, under the term adenoma, or some of its antiquated synonyms, as *tumeur adénôide*, *hypertrophie partielle*, *adenocèle*, or mammary glandular tumor, Birkett, Broca, Velpeau, Lebert, Bryant, and Paget, and more recently Cadiat and Lannelongue, described growths which they regarded as being true adenoma, but which differ from that neoplasm in their genesis, intimate nature, and clinical features, and which are composed, for the most part, of transformed preëxisting lacteal glands contained, but widely separated, in a fibrous stroma.

With the exception of myxoma, there is not a single neoplasm which is so uncommon as genuine adenoma, since it was met with, as I have pointed out

at page 9, only twice out of six hundred and forty-nine tumors of the breast. During the past year I examined and described four specimens¹ from the practice of other surgeons, and reported a case of my own, and have collated thirteen additional examples, which serve as the materials at my disposal for writing the life history and histology of this little understood formation.

The physiological type of adenoma is to be found in a mamma preparing for lactation. During the first pregnancy, and toward its termination, the glandular structure proliferates, through which there is a new growth of acini and ducts throughout the organ; these are contained in a vascular, succulent, loose, and comparatively sparse connective tissue, which is, moreover, rich in cellular elements. Pathologically, a new formation of lacteal glands takes place through a process of budding and extension into the proportionately scant interstitial stroma, as is shown in fig. 16, so that they preponderate, and represent a simple hyperplasia of the glands as a whole, and not merely of their investing epithelium, as is taught by most authors. A neoplasm which presents a likeness to the mamma of a female advanced in gestation may be styled a typical adenoma, as is represented in fig. 14;² but it is only a partial likeness, as the efforts of nature appear to be confined to the excessive produc-

¹ *Amer. Jour. Med. Sciences*, October, 1879, p. 459, and *Phil. Med. Times*, January 31, 1880, p. 218.

² From a growth, which is numbered 6,755, surgical section of the Army Medical Museum, and which was enucleated from the upper portion of the mamma of a mulatto, sixteen years of age, by Dr. Peter, of Georgetown, D. C. The tumor was of three months' duration, was ovoid and nodulated, and measured one inch and three quarters in length by one inch and a quarter in breadth. At the expiration of twenty-eight months there was no recurrence.

tion of glandular apparatus, without attempting to unite the acini into distinct lobules attached to excretory ducts. The criterion of adenoma is the pres-

FIG. 14.



TUBULAR ADENOMA.—Showing principally transverse sections of newly formed ducts. The epithelium, which is merely represented by the stained nuclei, is separated from the intertubular connective by the membrana propria. To the left of the figure a more highly magnified duct is shown, and its cuboidal epithelium is seen to rest upon the subepithelial layer of the thin endothelial cells of the limiting membrane.

ence of the membrana propria, which separates the investing epithelium from the surrounding connective. When it is broken through, and the epithelium grows as solid plugs into the stroma, the tumor ceases to be an adenoma and becomes a carcinoma.

Typical adenoma is so rare that of the five cases which I examined the one represented in the above figure is the only one that I have seen. Cornil and Ranvier,¹ Waldeyer,² Lücke,³ Foerster,⁴ and Wilks and Moxon,⁵ however, evidently met with it, as they

¹ *Op. cit.*, p. 291.

² *Virchow's Archiv*, Bd. xli, p. 516.

³ *Hdbch. der Allg. und Spec. Chirurgie*, Bd. ii, Abth. 1, Heft 2, p. 280.

⁴ *Op. cit.*, Bd. ii, p. 480.

⁵ *Lect. on Path. Anat.*, p. 583.

refer to tumors in which the newly formed acini, along with their epithelium, preserve their natural form and size, are provided with a central lumen, and are contained in a relatively small amount of connective tissue; and this description agrees with that of Deffaux,¹ excepting that he states that the acini are greatly dilated.

From the marked tendency which adenoma has to undergo cystic changes, it usually presents itself as an atypical growth, which is characterized by alterations in the shape, dimensions, and grouping of the enlarged and deformed glands, but in which the *membrana propria* is preserved. Thus, nearly five years ago I removed from the upper and inner circumference of the breast of a prolific married woman, forty-six years of age, a tumor of three years' duration, which was hard, perfectly mobile, bossed, almost spherical, of the volume of a walnut, and unattended with pain, tenderness, or changes in the skin, nipple, veins, or axillary glands. On section, the white, but here and there rosaceous-white, basis was dotted, but not to any considerable extent, with cavities, of which none were larger than a small pea, which were filled with a yellowish pultaceous or atheromatous material that could be expressed as plugs. Under the microscope, the greatly enlarged acini were seen to be packed, for the most part, with large, round, angular, elongated, and polyhedral cells, which had undergone fatty degeneration in the centre of the largest acini. The connective tissue was present in much less abundance than I have ever witnessed it in a lactating mamma, and it was in parts the seat of small-celled

¹ *Contrib. à l'Étude des Tumeurs du Sein d'Origine Épithéliale*, p. 17.

infiltration. Although the dilatation of the acini was similar to that of the secreting breast, the atypical grouping of the large and deformed cells served to distinguish the structure from that of the functionally active mamma, while from the presence of the atheromatous moulds, and the exclusive enlargement of the acini, the tumor is to be classed as a cystic acinous adenoma, the contents of the cavities being due to caseation of the epithelium.

The neoplasm in question corresponded almost exactly to one described by Billroth, the minute features of which are delineated in fig. 15,¹ from Rind-

FIG. 15.



CYSTIC ACINOUS ADENOMA.—The acini are seen to be greatly dilated, and more or less closely packed with transformed epithelium.

fleisch. From its peculiar appearances Billroth at first called it genuine epithelial carcinoma, and Rind-

¹ From a section of a tumor, as large as a child's head, and of twenty-three months' duration, which Billroth removed, in 1863, from a multipara, forty-two years of age. It was preceded by a thin, bloody discharge from the nipple, was hard, lobulated, mobile under the sound skin and upon the chest, and not tender. There were two small indurated glands in the axilla. The patient died of septicæmia on the seventh day. *Hdbch. der Allg. und Spec. Chir.*, Bd. iii, Abth. 2, p. 83, and *Langenbeck's Archiv*, Bd. vii, pp. 860 and 871.

fleisch¹ regarded it as canceroid hypertrophy. From this unfortunate nomenclature the term epithelioma is now used for tumors possessing this structure by Labbé and Coyne,² Malassez and Deffaux,³ and Duplay,⁴ although Neumann,⁵ Langhans,⁶ Cornil and Ranvier,⁷ Waldeyer,⁸ Klebs,⁹ and Lücke¹⁰ adhere to adenoma. Had the French authors not overlooked a subsequent paper in which Billroth gives a more detailed account of his tumor, and calls it cystoid adenoma, this confusion would probably not have arisen. It is to be regretted, as epithelioma implies the structure of so-called canceroid met with in other tissues and organs. Even as a generic term it is most objectionable, unless carcinoma, which is also an epithelioma in the sense of its arising from epithelial elements, be designated atypical, carcinomatous, or infiltrating epithelioma, to distinguish it from adenoma. Adenoma would then be regarded as typical, non-carcinomatous, or circumscribed epithelioma. From the fact, however, that the epithelial elements of adenoma may be, and usually are, irregular in their size, form, and arrangement, and thus produce an atypical epithelioma, which differs widely in its structure and life from carcinoma, the term had best be dropped altogether.

As I have just pointed out, adenomata are usually composed of enlarged acini, with aberrations in the characters of their investing epithelium, although they may be constituted mainly of newly formed

¹ *Op. cit.*, p. 537.

² *Op. cit.*, p. 333.

³ *Op. cit.*, ante.

⁴ *Op. cit.*, t. v, p. 632.

⁵ *Virchow's Archiv*, Bd. xxiv, p. 326.

⁶ *Ibid.*, Bd. lviii, p. 147.

⁷ *Op. cit.*, ante.

⁸ *Loc. cit.*, ante.

⁹ *Op. cit.*, p. 1201.

¹⁰ *Op. cit.*, ante.

ducts. When the acini predominate, they may be termed acinous; while they may be called tubular when the ducts preponderate. Of the eighteen cases,

FIG. 16.



CYSTIC TUBULAR ADENOMA.—*a*, Dilated and cystic acinus, giving off nine prolongations, in the form of tubes lined by columnar epithelium, which pursue, as a rule, a parallel course, but now and then divide and anastomose with one another and with offshoots from other acini, one of which is partially represented at *b*. The majority preserved their lumen throughout, although they frequently terminated in attenuated, solid, cellular processes, which sometimes were turned upon themselves. The intertubular young connective tissue was so very scanty that, on transverse section, many of the closely crowded tubules appeared to be separated merely by their adventitia.

eleven were cystic acinous growths. These include three recorded by Labbé and Coyne,¹ two by Fochier,² and one, respectively, by Steudener,³ Neumann,⁴ Billroth,⁵ Nancrede,⁶ Klotz,⁷ and myself.⁸ Seven were tubular; two of these are recorded by Langhans,⁹ and one each by Billroth,¹⁰ Morton,¹¹ Sloan,¹² Peter,¹³ and Levis,¹⁴ of which six were cystic. Hence it appears that pure adenoma is very uncommon, while the cystic acinous variety constitutes the majority; and the cystic tubular represents rather more than one-half, of which fig. 16¹⁵ is a beautiful illustration.

¹ *Op. cit.*, pp. 343, 352, and 356.

² *Lyon Médicale*, vol. xiv, p. 142.

³ *Virchow's Archiv*, Bd. xlv, p. 42.

⁴ *Ante.*

⁵ *Ante.*

⁶ *Trans. Path. Soc. Phila.*, vol. vi, p. 113.

⁷ *Langenbeck's Archiv*, Bd. xxv, p. 59, 1880.

⁸ *Amer. Jour. Med. Sciences*, *ante*.

⁹ *Ante.*

¹⁰ *Langenbeck's Archiv*, Bd. vii, p. 861.

¹¹ *Amer. Jour. Med. Sciences*, Oct., 1869, p. 462.

¹² *Phila. Med. Times*, Jan. 31, 1880, p. 218.

¹³ *Ibid.*

¹⁴ *Ibid.*, p. 217.

¹⁵ From a section of an ulcerated and fungating, moderately soft, somewhat lobulated tumor, of the volume of a child's head, of eighteen years' duration, from a spinster fifty years of age, which was removed by Dr. Morton at the Pennsylvania Hospital. It had been stationary for the first eight years, when it began to increase, and, at the expiration of twelve months, burst and discharged a bloody fluid, when it apparently disappeared. At the end of four months, another nodule manifested itself immediately below the site of the previous one, which, in its turn, at the expiration of two years and a half, opened, and was the seat of a constant discharge, which latterly was profuse, offensive, and bloody. The nipple was retracted, but the axillary glands were normal. After removal, the surface of the growth was uneven and nodular from underlying cysts, which were filled with blood, and the skin toward its base had a purplish tint. The fungus had a breadth of six inches, and the numerous cysts varied in size from a pin's head to a small egg, and possessed thin and blood-stained walls.

Adenoma differs from all other neoplasms of the mamma through its wonderful tendency to become cystic, seventeen of the entire number having undergone that transformation. The contents of the cysts may be fluid or semifluid, and are due to changes which ensue in the proliferating epithelium. In the former event, and ordinary fluid cysts were seen in eight examples, the secretion may remain lactescent, as in the cases of Nancrede and Neumann; or may be sanguinolent from the presence of vascular vegetations, as in one of the cases recorded by Labbé and Coyne; or even with the absence of very large vegetations, as in the examples of Morton and Levis. When the cells undergo advanced fatty changes, as happened in nine instances, the contents are of a rather dense caseous or atheromatous nature; but the cavities are usually minute, and never attain the volume of an egg, as is witnessed when the contents are fluid. Their size, indeed, rarely exceeds that of a hazel-nut, and the larger cavities are usually formed by the confluence, or breaking down, of contiguous ones. In five of the eighteen specimens, the lining epithelium was proliferating to form microscopic intraacinous vegetations or papillæ, which were purely epithelial in their composition when they were small, but were made up of delicate vascular connective tissue, clad with columnar epithelium, when they completely filled the acini, as was witnessed in the first case observed by Billroth.

With the exception of cystic changes, adenoma does not appear to undergo other degenerations, unless it be the telangiectatic, of which the cases of Morton and Levis are good illustrations; or the myxomatous,

as in an example of adenoma of the male mamma, which is recorded by Obolensky,¹ but which I have not included here. It is, moreover, rather liable to spontaneous ulceration, as that accident was met with in the four instances recorded by Fochier, Morton, and Levis; although it was threatened in one described by Labbé and Coyne. In another case, under the care of Labbé, the tumor protruded fungous vegetations as a result of injections of carbolic acid, and in that of Sloan the fungus was excited by lancing.

Adenoma is usually ovoid, and invariably bossed or nodulated in outline, but not largely so, and of a hard resistant consistence, although, when decidedly cystic, it may be uniformly soft and elastic, or, as more often happens, hard, except at the larger bosses over which it fluctuates. Although it is limited by a distinct fibrous capsule, it is, when of moderate volume, closely and broadly united to or incorporated with the mamma; but its attachment is less conspicuous as it increases in bulk. On section, the cut surfaces are smooth, lobed, of a milky-white color, with possibly rosaceous areas, and dotted with orifices or small cavities, to which, after the expression of their contents, is imparted a spongy, honeycomb, or sieve-like appearance. Now and then they are occupied by fluid cysts, which, however, rarely number more than three or four, are usually quite small, and rarely exceed the volume of a walnut. They are never pervaded by fissures or slits, nor are they the seat of dilated ducts with intracanalicular solid growths, such as are witnessed in the connective tissue neo-

¹ *Virchow-Hirsch's Jahresbericht*, Bd. i, p. 305.

plasms, or of yellowish lines or spots, such as are seen in carcinoma.

Adenoma is always solitary, and generally originates toward the upper and inner circumference of the mamma, being found either beneath or in the vicinity of the nipple in only one-third of all instances. It develops as early as the sixteenth and as late as the fifty-ninth year, the average age of its first observation being thirty-four years. Of the 18 examples,

2 appeared between 10 and 20 years.					
4	"	"	20	"	30
6	"	"	30	"	40
5	"	"	40	"	50
1	"	"	50	"	60

Of the entire number, not a single one occurred before the sixteenth year, or during the developmental state of the mamma; twelve, or 66·66 per cent., appeared previous to the fortieth year, or during the period of the greatest functional activity of the breast; and six, or 33·33 per cent., after that age, or during the functional decline of the gland. Eleven of the patients were married when the tumor was first detected, four were single, and in three the social condition is not stated. Of the married women, six were multiparous, two had one child, two were barren, and the question of children is not mentioned in one. In none did the neoplasm originate during lactation. The menstrual discharge was regular in all of the cases in which that function is noted. In one instance the disease was presumed to depend upon a puncture by a needle, and in one upon a blow; in none was it traceable to hereditary influence; in one, it was preceded by eczema of, and a milky discharge

from, the nipple on the removal of the crusts, which had, however, ceased for nine years; and in one by mammary abscess. The general health of the subjects was excellent.

The increase of adenoma is, upon the whole, less rapid than that of any other of the neoplasms of the breast, and is not influenced by lactation, pregnancy, or uterine disorders. In my own case the tumor attained the volume of a walnut in three years, while in that of Peter it grew to the same dimensions in three months; and in three cases it was as large as a hen's egg in two, six, and twelve months. Certain writers state that it does not exceed the latter volume, but it may reach the size of a fist in two, fifteen, or thirty-six years, or of a child's head in ten months, twenty-three months, or eighteen years. Hence the rate of growth is very variable, but the mode of growth is peculiar in being equable and uninterrupted. As a rule, the increase is so slow that many years may elapse before the tumor attains even a moderate bulk. Thus in the case of Morton, and in one of Labbé's, it was scarcely appreciable for, respectively, seven and ten years; while in another of Labbé's it was so excessively gradual that the almond-sized nodule required thirty-three years to reach the volume of an egg, after which it took on so rapid a growth that in three years it equalled the dimensions of a fist. The mode of increase appears also to be singular in that it goes on by the apposition of new nodules to the original tuber; this is due to the successive involvement of contiguous nodules, through which the entire mamma may be converted into a bossed tumor.

During its further progress adenoma evinces cer-

tain signs which, if they are not carefully studied, render it liable to be confounded with sarcoma and carcinoma. Thus, out of the sixteen cases in which the histories are complete, the subcutaneous veins were prominent in one; the skin was discolored in four, and it was adherent in six; the nipple was sunken, rather than retracted, in two, and a bloody or lactescent discharge from that body preceded the detection of the tumor in four; ulceration occurred late in the disease in four, and in two of these a red, vegetating, and bleeding fungus protruded through, without being attached to the margins of, the ulcer; and in two the axillary glands were enlarged from irritative hyperplasia. In 63·33 per cent. of all cases there is absolute freedom from pain; in 9 per cent. the suffering is moderate; while in 27·67 per cent. the pain is severe and lancinating, especially when the growth has been rapid.

Our knowledge of the prognosis of adenoma is unsatisfactory. In one of Fochier's patients, the parts were perfectly sound six months after operation. In the case of Peter there was no return in twenty-eight months; and in that of Sloan the woman was free from recurrence at the end of two years. One of Billroth's patients remained well for two years after the enucleation of a tubular adenoma, but there were several large and hard lobules in the vicinity of the cicatrix. In one of Labbé's cases local recurrence and enlargement of the axillary glands occurred in less than twelve months, and death ensued at the expiration of three years after the removal of the entire breast, but there was no post-mortem inspection of the body. The disease repro-

duced itself in the cicatrix in seven months after extirpation of the entire mamma of the patient of Steudener, but she was well thirty-one months after its removal. Of the remaining twelve, two are entirely devoid of a history of the termination, while seven recovered from operation, and three died from its effects. Hence adenoma recurs in one-half of all cases after operation, but there is no evidence to show that it infects distant organs. The relatively benign nature of the disease is, moreover, demonstrated by the fact that it had existed, on an average, nine years before extirpation, without affecting the general health. One case, indeed, was of nine, one of fifteen, two of eighteen, and one of thirty-six years' standing.

A small adenoma is very liable to be confounded with a small fibroma, but the latter is more distinctly circumscribed and isolable, and far more mobile in or upon the mamma, and its outline is not so decidedly bossed. Upon the whole, the diagnosis of adenoma is based upon its hard and heavy feel, its nodular outline, its pretty intimate attachment to the breast when of moderate volume, its mobility upon the chest, its slow and equable growth, its increase by the addition of small, compact nodules, its occurrence in married and prolific women toward the thirty-fifth year, the limited discoloration and adhesion of the skin and ulceration late in the disease, and freedom from retraction of the nipple, enlargement of the subcutaneous veins, and involvement of the lymphatic glands. If a tumor which presents these features has been preceded by a discharge from the nipple, there should be little difficulty in arriving at a correct conclusion as to its true nature.

CHAPTER IX.

CARCINOMA.

THE term carcinoma, which is synonymous with carcinomatous epithelioma and cancer,¹ is applied to an infiltrating atypical epithelial new formation, that is characterized, clinically, by local infection of the adjacent tissues and associated lymphatic glands, and by its marked tendency to general dissemination. A tumor which comprises these malignant attributes consists, structurally, of a cavernous fibrous stroma or framework, the meshes or alveoli of which are occupied by solid nests, plugs, or cylinders composed of loosely-heaped polymorphous epithelial cells; these cells are suspended in a serous fluid, without, however, the intervention of a cementing intercellular substance.

In addition to carcinoma, adenoma and a variety of sarcoma possess an alveolar stroma filled with cells, so that a hasty examination of thin sections may lead to confounding these three classes of neoplasms. In typical adenoma the dilated lacteal glands, which constitute the alveoli, are lined by a single layer of

¹ The word cancer is employed by the majority of English writers as the equivalent of malignant; but it is used here, interchangeably with carcinoma, to express anatomical, and not clinical, features. There are other tumors of the breast which are nearly as malignant as carcinoma, or cancer, but which present no structural likeness whatever to it.

cuboid or columnar epithelial cells that rest upon the intact *membrana propria*. Hence the cell-cylinders are hollow, or provided with a central lumen, and they do not infiltrate the connective tissue framework of the gland. In carcinoma, on the other hand, the epithelial plugs are solid; the *membrana propria* is destroyed, and the lymph spaces of the connective are infiltrated by the advancing cell-cylinders or processes. In atypical adenoma the acini are enlarged and packed with multiform epithelial cells; but the latter also rest upon the *membrana propria*, through which infiltration of the periacinous connective is prevented. The presence of the *membrana propria* serves, therefore, to differentiate adenoma from carcinoma. In alveolar sarcoma the cells are of the connective tissue type, pretty uniform in shape and size, and intimately united with one another and with the walls of the alveoli by intercellular substance, so that the cells and stroma are interwoven into a single tissue, instead of being easily separable into two distinct tissues, as happens in carcinoma.¹

Although an alveolar fibrous stroma is so important a constituent of carcinoma that Cornil and Ranvier² declare that carcinoma should more appropriately be termed alveolar fibroma, it is not, of itself, any more than are the aggregations of cells a sufficient basis for histological diagnosis. The stroma, which represents, partly, the original framework of the mamma, and, to a greater extent, newly formed connective tissue, is denser than that found in adenoma and sarcoma, but differs in structure and abundance in the varieties of carcinoma. Many of the alveoli

¹ See page 68.

² *Op. cit.*, p. 111.

of the latter are, moreover, unlike what happens in adenoma and sarcoma, lined by the endothelial cells of the lymph spaces into which the carcinomatous plugs have grown. The cells are not endowed with specific characteristics. There are no such elements as "cancer cells"; they are merely enlarged and deformed epithelial cells, many of which possess multiple nuclei, and are very prone to undergo fatty degeneration. Hence, the determination of carcinoma depends upon the combined characters of the cells and stroma and their mutual arrangement.

The histogenesis of cancer, as I have shown in Chapter II, is still the subject of much dispute; but I am convinced, from examinations of numerous sections of at least one hundred specimens, that the exclusive view of Waldeyer¹ as to its derivation from the glandular apparatus is correct. Thus, in sections made from the peripheral or developing zone, the acini, and, occasionally, the ducts are seen to be enlarged, deformed, and more or less completely filled with proliferating epithelium, and to be surrounded by the membrana propria. The periacinous connective tissue is, at the same time, infiltrated by lymphoid cells, so that the entire picture resembles an irritative or chronic inflammatory process, and is very similar to what I have already described as atypical adenoma. During the second stage the small-celled infiltrate leads to the new formation of connective tissue, while further alterations ensue in the shape of the acini, the epithelial cells change their characters, and the membrana propria disappears. In the final stage, or when the development is complete, the acini, as is represented

¹ *Virchow's Archiv*, Bd. xli, p. 478.

in fig. 17,¹ have extended or grown into the new connective tissue and the preëxisting lymph spaces as

FIG. 17

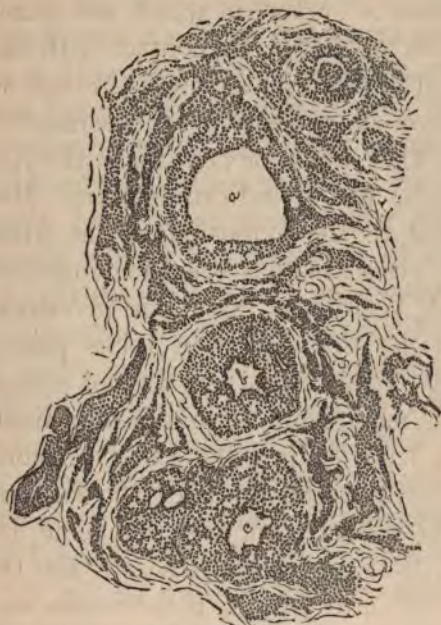


Fig. 17, reduced one-half.

DEVELOPMENT OF CARCINOMA.—*a, b, c*, enlarged acini, more or less closely packed with polymorphous cells, the undermost layer of which is columnar. At *b* the membrana propria is intact, while at *a* and *c*, below and to the right, it has disappeared, and the cells are extending into the stroma. The connective tissue framework is pervaded by variously shaped, simple or branched, solid cell-cylinders, which are the outgrowths of other acini. The cells themselves are merely indicated by their stained nuclei.

solid, round, oval, or branching cylinders, plugs, or bodies, whereby the normal appearance of the mammary gland is destroyed.

¹ From a section of a tubular scirrhous, of one year's duration, which was removed, along with two enlarged axillary glands, by Professor Gross from a German fifty-nine years of age. The disease was preceded by psoriasis of the nipple, and recurred in the axilla in five months. Nearly five months subsequently I removed the axillary growth, which was as large as an egg, and was

In none of the numerous sections which I have examined have I ever been able to detect the multiplication of the endothelial cells of the stroma; nor am I a believer in the transformation of the cells of other tissues or organs, in which secondary or metastatic tumors are found, by contact with the epithelial elements of the original growth through some mysterious "action de présence," or "spermatic influence." Although the tubers or nodules in the skin and pectoral muscle, which indicate regional dissemination, may be due to the extension of the disease by the lymphatic vessels, as has been demonstrated by Langhans¹ and Waldeyer,² my own investigations have convinced me that infection takes place along the perivascular lymph-sheaths. In not a single instance of sections made from nodules seated in the adjacent structures have I witnessed the extension of epithelial cells beyond the limits of the lymphatic vessels to form the tubers. On the other hand, I have never failed to discover, as is shown in fig. 18,³ that the lymphatic sheaths of the bloodvessels were more or less closely packed with young epithelial elements, through which their lumen was frequently diminished or even obliterated. Even in those cases—and I have examined three—in which the skin covering the car-

composed of sixteen glands. The history of the case may be found in the *Phil. Med. Times*, July 5, 1879, p. 484.

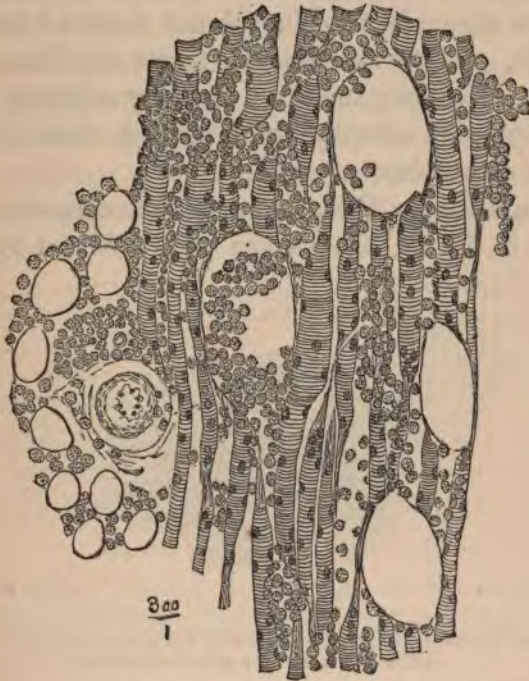
¹ *Archiv für Gynækologie*, Bd. viii, p. 181.

² *Virchow's Archiv*, Bd. xli, p. 485.

³ From a section of a nodule of the pectoral muscle, which I extirpated, along with an atrophying scirrhus, of fourteen years' duration, and a densely hard axillary glandular tumor, from a prolific married lady forty-five years of age, on account of severe suffering. Her general health was excellent, and she still menstruated. The macroscopic features of the tumor of the mamma are represented in fig. 29.

cinomatous mamma was pervaded by convex, elevated ridges, as large as crows' quills, and which conveyed to the naked eye the idea of thrombosed lymphatics,

FIG. 18.



EXTENSION OF CARCINOMA INTO THE GREAT PECTORAL MUSCLE.—To the left of the figure is seen a transverse section of an artery, the upper portion of the lymph sheath of which is infiltrated by epithelial cells. The alveoli between the primary muscular fasciculi are due to the absorption or disappearance of the greater portion of the latter from the pressure exerted upon them by the accumulations of cells in the interfascicular connective tissue. At several points the muscle corpuscles are seen to be more abundant than is normal, but this is an irritative phenomenon, and there is no evidence that they participate in the carcinomatous degeneration. The nuclei of the cells alone are delineated.

I have only found dilated lymphatics filled with coagulated lymph.

The varieties of carcinoma are determined by the

relative proportion of the stroma and cells, by certain degenerations and transformations, and by the accidental formation of cysts.

1. FIBROUS, OR CONNECTIVE TISSUE, CARCINOMA, which is equivalent to the tubular form of cancer of Billroth, and to the clinical terms scirrhus, hard, or chronic cancer, includes ordinary scirrhus, simple carcinoma, and atrophying, retracting, withering, cicatrizing, or obsolescent scirrhus.

a. In ordinary fibrous, or scirrhus, carcinoma, as is shown in fig. 19,¹ the stroma predominates over the

FIG. 19.



FIBROUS, OR SCIRRHUS, CARCINOMA.—Showing the preponderance of the fibrillated stroma over the collections of cells.

collections of cells. The trabeculae of the former consist either of undulating connective tissue, which may be rich or poor in endothelial cells, in accordance with the stage of their development, or of a non-undulating, faintly fibrous, or entirely homogeneous

¹ From a section of a tumor of two years and a half duration, which I removed, along with the entire breast and axillary glands, from a married and prolific woman fifty-seven years of age. The skin over the growth was occupied by a few nodules; the nipple was stiff, but not retracted; and the breast was mobile on the pectoral muscle.

and refracting tissue. The cells contained in the alveoli do not attain the dimensions of those met with in encephaloid carcinoma, nor are they so liable to fatty degeneration.

β . SIMPLE CARCINOMA, denominated fibroso-medullary by Waldeyer, stands midway between soft carcinoma and ordinary scirrhus, the proportion between the cells and stroma being about equal.

γ . In ATROPHYING SCIRRHUS the epithelial elements undergo fatty degeneration, whereby they are partly converted into a granular emulsion, which

FIG. 20.



ATROPHYING SCIRRHUS.—Showing fatty remains of cells, which would not stain, contained in small spaces between thick bundles of fibrous tissue, transverse and oblique sections of which are represented at two points.

is absorbed, while the contracting stroma renders the alveoli smaller and narrower, so that they are merely represented by a few elongated or fusiform clefts, as in fig. 20,¹ between the thick tendinous

¹ From a section through the centre of a greatly shrunken and discoid and slightly ulcerated breast, which I removed after death, or seventeen years and a half from the first appearance of the growth, from a multiparous widow sixty-three years of age. The skin over the entire thoracic region was pervaded by secondary nodules; the opposite mamma and axillary glands were invaded; the pectoral muscles of the corresponding side were, for the most part, converted into densely hard carcinomatous material, and the axillary and supraclavicular glands were indurated and much enlarged. Both pleuræ and both lungs, the

or sclerosed bands of fibrous tissue, which contain fatty detritus, or, as is shown in fig. 21,¹ one or

FIG. 21.



ATROPHYING SCIRRHUS.—Showing long spaces occupied, for the most part, by a single row of cells, and contained between thick bundles of fibrous tissue.

more rows of unchanged cells. Were it not for the fact that the peripheral zones of the growth disclose the usual structure of scirrhus, as in fig. 18, from the same specimen, atrophying carcinoma might readily be confounded with contracting fibroma.

2. MULTICELLULAR CARCINOMA is synonymous with the acinous carcinoma of Billroth, and the tuberos, medullary, encephaloid, soft, or acute cancer of the clinician, and is characterized by the enormous production of the epithelial constituents, and the relatively small amount of the supporting connective tissue, through which the width of the alveoli is far greater than that of the trabeculæ of fibrous tissue which form their walls, as is seen in fig. 22.²

bronchial and mediastinal glands, the opposite half of the diaphragm, and one kidney were the seat of metastatic tumors.

¹ From a section near the advancing margin of a tumor of fourteen years' duration, the history of which is attached to fig. 18, and the gross appearances of which are represented in fig. 29.

² From a section of a tolerably firm and elastic tumor, nearly as large as a

The cells of this variety are not only much larger, and more liable to fatty changes than those of any

FIG. 23



ENCEPHALOID CARCINOMA.—Showing the large size of the alveoli, the walls of which are constituted by thin bands of young connective tissue. The nuclei of the cells are alone represented.

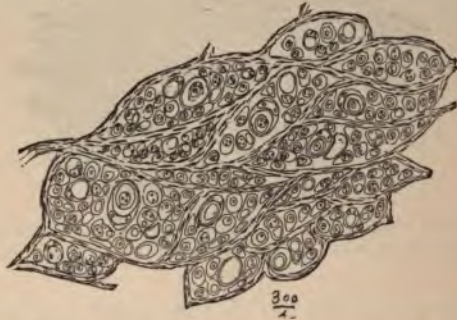
other form of carcinoma, but they are frequently the seat of endogenous growth or vacuolation, as is so strikingly represented in fig. 23.¹

child's head, and weighing over three pounds, removed from a married and prolific woman seventy-one years of age. It had begun three years previously, and was attributed to a severe blow. Above and to the inside of the retracted nipple there was a tuber of the volume of a small orange, and covered by thin, adherent, and discolored skin. Radiating from the nipple toward the axilla there were a number of beaded lymphatic vessels, and the axillary glands formed a tumor as large as a turkey's egg. During the last four months of its existence it had increased rapidly, and produced great discomfort from its weight. The greater and lesser pectoral muscles were extensively infiltrated. On section, there was an escape of thin, sanguinolent fluid, and the cut surfaces of the mass were pervaded by yellowish areas of caseous degeneration.

¹ From a section of a soft tumor of nine months' duration, removed by Professor Agnew from a multiparous married lady, fifty-three years of age. The subcutaneous veins were somewhat enlarged; but the skin, nipple, and axillary glands were normal, and there were no adhesions. The disease recurred in the cicatrix in two months, increased rapidly, was painful, and occasionally bled; and death ensued suddenly, three months and a half subsequently.

In four specimens which I examined, the delicate trabeculæ of the stroma were infiltrated by small cells in three, and composed of a spindle-celled tissue in the other, so that it might with propriety

FIG. 23



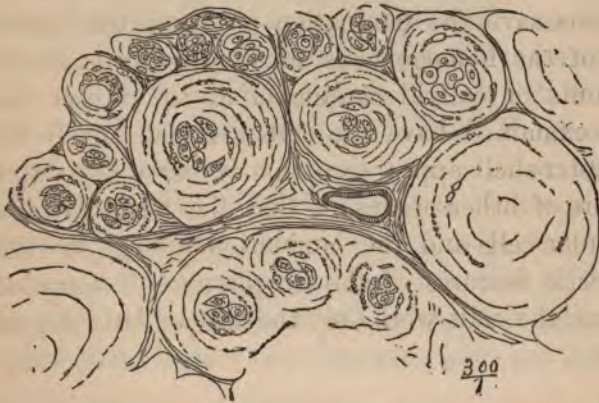
ENCEPHALOID CARCINOMA.—The alveoli are filled with large cells, almost all of which are vacuolated. The largest contain a nucleated cell, while many, from the situation of the nucleus at their periphery, present the characteristic signet-ring appearance. A few are merely hollow vesicles.

be called a sarcomatous carcinoma, of which an illustration is to be found in Mr. Arnott's monograph on *The Histology and Diagnosis of Cancer*. In other specimens the walls of the alveoli are constituted mainly by embryonic bloodvessels surrounded by a thin layer of soft connective tissue, giving rise to telangiectatic carcinoma, or fungus hematodes, as it is more commonly termed, from its macroscopic features. It should be observed that medullary carcinoma is not always a soft tumor. The specimen from which fig. 22 was derived was tolerably firm and elastic, and the cells had not undergone advanced fatty changes, so that the masses of cells distended the alveoli to the uttermost. Under opposite circumstances, or when the cells have degenerated, and the

tension of the alveoli is lessened or lost, the growth is soft and even pseudofluctuating.

3. COLLOID CARCINOMA.—Colloid, or gelatinous, carcinoma differs from the preceding varieties only in the fact that the protoplasm of its cells has undergone colloid degeneration.¹ It is sometimes called mucous, or alveolar, cancer; but as the metamorpho-

FIG. 24.



COLLOID CARCINOMA.—Showing the large alveoli distended by the colloid material, in which are contained a few cells and concentric laminae of cellular detritus.

sis is not of a mucoid nature, and as all carcinomata are alveolar, these terms are misnomers.

A section of such a tumor discloses that, in its

¹ Although Billroth, Wagner, Klebs, Waldeyer, and other pathologists teach that colloid cancer is merely an ordinary cancer in the highest stage of colloid metamorphosis of its cells, Virchow and Lebert hold that it depends upon the colloid character of its stroma; Foerster and F. E. Schulze upon colloid degeneration of both the cells and stroma; and Doutrelepont, with whom Rindfleisch appears to agree, upon colloid transformation of the amorphous formative or germinal material, out of which, under ordinary circumstances, the young cells of carcinoma are derived.

early stage, the heaps of cells are merely separated from the walls of the alveoli by a structureless colloid substance. As the transformation advances, the cells, as in fig. 24, from Rindfleisch, are massed toward the centre of the greatly enlarged alveoli, and surrounded by the colloid material, which is marked by concentric circles or layers of dotted lines, the dots representing the nuclei and granular remains of the cells that have been successively invaded by the change. With the still further advance of the metamorphosis, the cells disappear entirely, and nothing remains save the lamination or concentric stratification of the homogeneous substance. In none of the accounts of colloid carcinoma of the breast that I have examined have the cells assumed the bandbox or oyster-shell appearance that is met with in similar tumors of other organs, so that the large, refractory, vesicular cells and the lamination are the most characteristic features of the neoplasm. In some cases, indeed, the cells were only the seat of fatty degeneration.

4. MELANOTIC, OR PIGMENTED, CARCINOMA is characterized by the infiltration of the cells with granules of melanin or altered hematoidin.

5. CYSTIC CARCINOMA.—It sometimes happens that the obstructed and dilated terminal acini and ducts of mammae which are the seat of cancer are converted into cysts through mucoid or fatty transformation of their epithelium. In addition to these simple retention or involution cysts, that are combined with, although they precede the development of, carcinoma,

cysts are sometimes met with, as in fig. 25,¹ which are more or less completely filled with vascular, epithelial-clad vegetations, or papillæ, which are merely protrusions of the periacinous connective tissue into their interior, and are themselves devoid of carcino-

FIG. 25.



CYSTIC ENCEPHALOID CARCINOMA.—Showing, in addition to simple cysts, two cavities occupied by vegetations.

matous structure. Cornil and Ranvier² describe this proliferating form as villous carcinoma; while Neumann³ terms the case which he records encysted medullary carcinoma. It is not, however, peculiar to soft carcinoma, as a specimen of scirrhus in the collection of Professor Gross shows a similar combination; and Mr. Wood⁴ reports an example of hard carcinoma of the male mamma in which the papillæ were so vascular as to convert the cavities containing them into blood cysts.

In addition to the preceding varieties, we may have a myxomatous cancer through mucous transformation of the stroma, or a calcifying cancer through

¹ From a medullary carcinoma, devoid of history, from the cabinet of Professor Gross.

² *Op. cit.*, p. 1167.

³ *Virchow's Archiv*, Bd. xxiv, p. 319.

⁴ *Trans. Path. Soc. London*, vol. xxv, p. 223.

the deposition of the salts of lime in the alveoli and between the trabeculæ of the framework, as in the examples recorded by Ackermann¹ and Creighton;² or the fat cells of the stroma may preponderate to such an extent as to constitute a lipomatous carcinoma. These changes are, however, met with to so limited an extent that they can scarcely be said to constitute varieties, although, if it be deemed desirable to notice them, they may be retained as prefixes to indicate subordinate degenerations and transformations.

The gross characters of the varieties of carcinoma correspond so closely to their minute features that the true nature of a specimen may be pretty accurately determined by its macroscopic appearances. Ordinary scirrhus has an irregular, rounded, nodular outline, and is frequently flattened, or slightly cupped, on its pectoral surface, so that it assumes a discoid shape. Its size is moderate, being usually not larger than a small lemon. Its consistence is densely hard and unyielding, and it is heavier than any other mammary neoplasm of equal volume. On section, it is crisp and tough, and the cut surfaces contract and become concave, and exude, on pressure or scraping, a milky or turbid granular fluid or juice. The homogeneous, refracting, grayish-white surface is made up of interlacing bands, between which are intercalated yellowish-gray or yellow granular spots or dots, and lines or stripes, which are indicative of fatty and caseous degeneration of the cells. At the periphery the section is also marked by pellets of normal fat, from their inclusion in the advancing infiltration.

¹ *Virchow's Archiv*, Bd. xlv, p. 60.

² *Op cit.*, p. 169.

Simple carcinoma has a bossed outline, and attains a much larger bulk than the preceding variety, the volume of a large orange being not infrequent; or it may even measure between five and six inches in diameter, as happened in one of my cases. Its consistence is firm, rather than hard; its section is moderately tough, and the cut surfaces do not become concave. The juice is more abundant and more grumous; and areas of caseation, softening, and increased vascularity are not uncommon.

Medullary carcinoma exhibits the same general characters as the simple variety, although it is usually lobulated, and attains still larger dimensions, the volume of a child's head being quite frequent. Its consistence is generally soft and elastic, and even pseudofluctuating. The firm variety has a homogeneous white surface on section, while the soft form is made up of a grayish-white basis, mottled with pink, red, or brown areas, indicative of increased vascularity and slight effusions of blood. When the tissue resembles a recent coagulum, or contains spaces filled with blood, the tumor is termed hematoid cancer, which is synonymous with fungus hematodes.

Atrophying scirrhus is the most dense, rigid, and inflexibly hard, and at the same time the smallest, of all the varieties. It creaks under the knife; and its cut surfaces are deeply concave, of a tendinous, glistening, bluish-gray lustre, and dotted here and there with pale yellow granular spots. The juice, if any at all can be expressed, is of a thin and citron-colored serous nature.

Colloid carcinoma is, as a rule, as hard as ordinary scirrhus. Only one specimen in every twelve is

soft; and it seldom attains larger dimensions than that variety, a volume of the fist being exceptional, and then only after a very chronic course. The cut surfaces are characterized by an exquisite alveolar structure, filled with a translucent, or a cloudy-yellowish, yellowish-gray, or grayish-white, or possibly blood-stained, gelatinous substance.

Melanotic cancer is nothing more than ordinary scirrhus in a state of pigmentation.

In cystic carcinoma the cut surfaces are pervaded by cavities, which vary in size from a millet-seed to a walnut, and contain either fluid or solid contents, the latter being in the form of dendritic vegetations, that impart to the section the appearance of a vegetating or proliferating fibroma or sarcoma. The basis of such tumors is usually composed of medullary tissue, although ordinary scirrhus carcinoma is not free from these changes.

As a class, the carcinomatous tumors may be distinguished from the non-carcinomatous by their inseparable connection with the breast, which they infiltrate, so that they are not provided with a limiting capsule; by their containing areas of fat; and by the absence of large intracanalicular vegetations, which are so common in the cystic variety of the latter growths. Ordinary scirrhus is also characterized by the concave appearance of its cut surfaces.

Of the relative frequency of the varieties of carcinoma, it may be said that out of every 100 cases¹ we may expect to find 77 of ordinary scirrhus, 11 of sim-

¹ Based upon 56 minute examinations made by myself, and 64 out of 192 cases tabulated by Dr. A. Henry, in his *Statistische Mittheilungen über den Brustkrebs*, Breslau, 1879.

ple carcinoma, 7 of atrophying scirrhus, and 5 of encephaloid carcinoma. Combination with cysts is so rare that I have met with them only once out of fifty-six specimens. Colloid carcinoma is so excessively infrequent that I have never seen it; nor is it referred to by Billroth¹ in a record of 245 cases; nor by Henry and by Oldekop² in their tables, respectively, of 192 and 250 examples. Melanotic carcinoma of the female mamma is, as far as I am aware, unknown, although Marciano³ and Chenet⁴ each report a case as occurring in the male mamma; and Billroth⁵ describes a carcinoma of the female breast with a pigmented alveolar stroma.

In addition to colloid transformation, calcareous infiltration, and pigmentation, carcinoma is excessively liable to fatty and granular degeneration of its cells, and less frequently to caseation through atrophy and desiccation of the fatty cells. These changes, which are indicated macroscopically by yellow or yellowish-white spots or streaks, constitute the regressive carcinoma of Heinrich Meckel, or the reticular carcinoma of Johannes Müller; and they always precede the cicatricial formation met with in atrophying scirrhus. Cystoid spaces or cavities not infrequently result from the disintegration of the cells, and the accumulation of the turbid fatty detritus in the softened tumors, over which, if superficially seated, the discolored skin

¹ *Chir. Klinik*, Wien, 1871-'76, p. 266.

² *Statistische Zusammenstellung der in der Klinik des Herrn Prof. Dr. Esmarch zu Kiel in den Jahren, von 1850-1878, beobachteten 250 Fälle von Mamma-Carcinom.* *Langenbeck's Archiv*, Bd. xxix, pp. 536 and 693.

³ *Bull. de la Soc. Anat.*, t. xlix, p. 921.

⁴ *Virchow-Hirsch's Jahresbericht*, Bd. ii, 1876, p. 422.

⁵ *Chir. Klinik*, Wien, 1869-'70, p. 177.

finally gives way. In the event of the bloodvessels of the stroma being attacked by fatty degeneration, these softening cysts also contain extravasated blood.

When cancer takes on rapid growth, and is attended by an extensive small-celled infiltration of its framework, it is prone to inflame, as is indicated clinically by increase of suffering, elevated temperature, and discoloration of the skin. Under these circumstances, and particularly when the tumor develops during pregnancy or lactation, an abscess may form at the expense of the infiltrated connective tissue, the epithelial cells themselves not participating in the morbid process. Even when the mamma is not functionally active, suppuration may ensue, as in the case of a married sterile woman, thirty-nine years of age, whose breast I extirpated last July. The tumor, which had acquired the volume of an egg in less than two months, contained an abscess as large as a filbert, filled with greenish pus.

Carcinoma¹ never develops before puberty; and I have never seen it before the twenty-eighth year, although Henry records a case at twenty-one, which is, if I do not mistake, the earliest that has been observed. It is very rare before thirty, after which age it gradually increases to between forty-five and fifty, when it reaches its maximum of frequency, forty-eight years being the average, and then decreases; it is very uncommon after seventy. Of 642 cases, in which the age is noted,

¹ The general pathology of cancer is based mainly upon a study of 712 cases, of which 250 are recorded by Oldekop from Esmarch's clinic, 192 by Henry from the Breslau clinic, 170 by Von Winiwarter from Billroth's clinic, and analyzed in his *Beiträge zur Statistik der Carcinome*, Stuttgart, 1878, and 100 by myself in the *Boston Medical and Surgical Journal*, March 25, 1880.

18 first appeared between 20 and 30 years of age.						
128	"	"	"	30	"	40
245	"	"	"	40	"	50
165	"	"	"	50	"	60
78	"	"	"	60	"	70
8	"	"	"	70	"	80

Of the entire number not one was observed during the developmental state of the mamma; 146, or 22·74 per cent., appeared during the period of its greatest activity, or up to the age of forty; and 496, or 77·26 per cent., began after that age, or during its functional decline.

Of 187 cases, analyzed by Winiwarter and myself, in which the catamenia are mentioned, 115, or 61·5 per cent., were menstruating at the date of the development of the disease; and only 6·41 per cent. of these were irregular in the performance of that function.

Of 688 women in whom the social condition is noted, 607, or 88·22 per cent., were or had been married, and 81, or 11·77 per cent., were single. Of 435 in whom it is mentioned, 365, or 83·91 per cent., had borne children, and of these nearly nine-tenths had more than one child; while 70, or 16·09 per cent., were barren. With regard to nursing, I find that, of 259 patients in whom it is referred to, 191, or 73·74 per cent., had suckled their infants, while 68, or 26·25 per cent., had not. In 13 of 262 fertile women, or nearly 5 per cent., the disease is stated to have developed during pregnancy or lactation.

The influence of hereditary predisposition and of the general bad health of the subjects upon the development of carcinoma is not so marked as some teachers would lead us to believe. Thus, of 389

women, in whom the former point is noted, 40, or 1 in every 9·72, stated that cancer had occurred in their ancestors; while of 189 in whom the general condition is mentioned, 97, or 51 per cent., were in robust health; 34, or 18 per cent., were in good health; 37, or 19 per cent., were pale and thin; and 21, or 12 per cent., were decidedly broken down from the effects of the disease. Hence, even when the patients first come under observation, less than one-third appear to be injuriously influenced by the progress of the affection; and it may safely be asserted that the nutrition of scarcely one in twenty suffers previous to sixteen months after the detection of the growth.

In addition to the foregoing antecedents, there are other conditions which are assumed to excite the development of cancer. Thus, in 11·7 per cent., or 23 out of 270 cases, analyzed by Winiwarter and myself, the disease was ascribable to trauma, as blows and contusions; in 5, or 1·35 per cent., of the 370 cases from Oldekop's and my own tables, it was preceded by eczema or psoriasis of the nipple;¹ and it started from lumps or chronic indurations left by puerperal mastitis in 30, or 8·21 per cent., of the 365 women who had borne children.

Carcinoma usually commences as a small, painless, circumscribed, densely hard, uneven, or nodulated tuber, which is movable under the skin, but fixed in or to the breast itself. In 1 case out of every 48, or in 2·08 per cent., several distinct nodules are met with, which evince a marked tendency to coalesce as the disease progresses. It now and then occurs

¹ Mr. Henry Morris records, in the *London Lancet*, vol. ii, 1872, p. 873, antecedent eczema in 2 out of 205 cases, which reduces the percentage to 1·03.

as an infiltration of the entire gland. It is more frequent, by 5.45 per cent., in the right than in the left breast. While Oldekop and Winiwarter agree that the upper portion of the outer hemisphere of the mamma is its most common seat, my own 100 cases show that 56 occupied the vicinity of the nipple, 7 having been discovered immediately behind that body, 19 at its outer side, 12 at its inner side, 6 below, and 12 above—facts which will serve to explain, as I shall indicate presently, the frequency with which I have met with retraction of the mammilla. Of the remaining 44 cases, 33 were located toward the outer circumference, and 11 toward the inner periphery, and of these only 18 occupied the upper hemisphere. On the whole, the seats of election of cancer are the upper and outer quadrant, and the immediate neighborhood of the nipple.

The increase of carcinoma, when compared with the other mammary neoplasms, is slow, so that it rarely attains any considerable bulk. In ordinary scirrhus and colloid cancer the tumor is usually smaller than the gland or portion of the gland that it has replaced; in simple scirrhus the volume of a small fist is not uncommon, and it may even measure five inches and a half in diameter, as happened in one of my cases which had lasted three years before it was extirpated; in withering scirrhus, the tumor is rarely as large as a walnut, while in medullary carcinoma the size of a child's head is not uncommon. Hence the volume depends upon the relative proportion of the component constituents, being large when the cells predominate, and small when the fibrous stroma is in excess.

The rate of growth is not, contrary to the generally received opinion, influenced by the early age of the patient, since I have failed to discover that the increase is more rapid before the age of forty than when the tumor develops later in life. When, however, carcinoma appears during pregnancy or during lactation, its growth is wonderfully rapid, and its course is excessively malignant, of which fact several striking instances are recorded by Klotz¹ and Paget.² In a case reported by Billroth,³ the disease developed in both breasts five weeks before the woman's eighth confinement; and on death, one week after an easy and natural delivery, or six weeks after the first observation of the disease, the mammæ were larger than a child's head, and secondary deposits were found in the thyroid gland, pericardium, liver, omentum, and kidneys.

During its further increase—and it grows by progressively invading or infiltrating the tissues at its periphery—or when it has attained only a moderate volume, carcinoma evinces signs which are of great diagnostic value even before the contiguous structures are visibly contaminated, and which are referable to its tendency to contract or draw the component tissues of the breast itself and the adjacent structures into its midst—a tendency due to cicatricial or atrophic changes going on in its older or more central portions.

Among the earliest of these phenomena, particularly when the tumor is superficial, is a dimpling or

¹ *Ueber Mastitis Carcinomatosa Gravidarum et Lactantium*. Inaug. Diss., Halle, 1869.

² *Op. cit.*, p. 639.

³ *Chir. Klinik*, Wien, 1871-'76, p. 258.

pitting of the skin. This pitting is entirely independent of carcinomatous adhesion between the skin and the growth, and arises from shortening of the fibrous bands or processes of the superficial mammary fascia which pass from the posterior surface of the skin into the interior of the breast, and which Sir Astley Cooper called the suspensory ligaments. This sign, along with the age of the patient and the consistence of the growth, enabled me to diagnose the true nature of a tumor of the size of a small filbert, and of five months' duration, situated at the clavicular border of the gland, before its removal.

In 5.22 per cent. of the non-carcinomatous neoplasms of the breast the nipple is buried, displaced, or sunken, simply for the reason that the tumor grows beyond its level, so that by pushing back the former the nipple again partly protrudes. In carcinoma, on the other hand, the mammilla is permanently retracted and fixed, as is shown in fig. 29, because the contracting growth draws it toward itself by shortening the milk ducts which terminate at its extremity; and this process is the more apparent when the neoplasm develops in the immediate vicinity of the lacteal sinuses, or when the nipple itself is infiltrated and becomes the seat of cicatricial contraction. In my own 100 cases—and Winiwarter, Henry, and Oldekop do not refer to this point—a retracted nipple was observed in not less than 52; and as it was sunken in only 1 out of every 19½ examples of the non-carcinomatous neoplasms, I regard it as a sign the value of which cannot be overestimated. In one of my patients it was the first sign, along with a straw-colored discharge, that directed attention to the disease.

To the same cause, or inaction of, combined with pressure upon, the nervous filaments which supply the breast, may be ascribed the pain of which patients so commonly and so early complain. Usually of an intermittent, darting, pricking, or neuralgic character at the outset, the suffering becomes more constant and aggravated with the progress of the disease, and particularly when the skin is extensively invaded and ulcerated, and the lymphatic glands infiltrated, until, finally, it is frequently atrocious; extending in various directions, as, for example, to the shoulder, neck, back, and arms, interfering with sleep and nutrition, and hastening the fatal issue. In 4 per cent. of all cases there is absolutely no suffering whatever; in 8 per cent. there is merely a sensation of discomfort or weight; while in 88 per cent. there is real pain, which varies, however, greatly in intensity and character.

With the further advance of the disease, but not, on an average, before the expiration of thirteen months after its first observation, marked changes ensue. These indicate, first, local infection, or regional dissemination, through the extension or growth of young epithelial cells, along the course of the lymph and bloodvessels,¹ into the adjacent tissues; and, secondly, the transfer of the cells by the lymphatic vessels to the associated lymphatic glands. These changes, when regarded in their chronological order, are invasion of the skin, the glands, the muscles of the chest, the ribs, the pleura, and the opposite breast.

Infection of the contiguous tissues shows itself

¹ The transfer of infectious cells along the bloodvessels is shown in fig. 18.

either in the form of adhesion or fixation of the tumor to the skin and walls of the chest, or as distinct nodules or tubers which are visible to the naked eye when superficial, or are detected during operative procedures.

Of 631 cases, in which the point is noted, inva-

FIG. 26.



DISSEMINATED SIMPLE CARCINOMA.

sion of the skin, as evinced by its adhesion or discoloration, was met with in 218, or 34·54 per cent.; by the formation of tubers in 67, or 10·61 per cent.; and by ulceration in 150, or 23·77 per cent., so that it is

involved in 68.92 per cent. of all instances. In the majority of cases, the skin is adherent, thinned, and of a purplish, bluish-red, or dusky-red tint, with enlargement of its small vessels, and possibly superficial and limited desquamation, conditions which precede ulceration. In some examples it is rigid and brawny, like the skin of a lemon or the rind of bacon, and, now and then, pervaded by varicose lymphatics and cedematous; or it may be drawn in so as to resemble a cicatrix. When nodules form, they may present the appearance of flat, irregular plates; but they are usually shot-like or pea-like or biconvex, and frequently attain the size of a hazel-nut or a small hickory-nut, and are covered by discolored skin. Occasionally, and particularly when the subcutaneous connective tissue is simultaneously involved, they form large masses, as in fig. 26¹ from one of my cases,

¹ Eliza C., aged fifty-five years, the mother of two children, ceased to menstruate fourteen years ago, and was not aware of a family history of cancer. About two years ago, while washing the right breast, she accidentally noticed a firmly fixed, painless growth, as large as an English walnut, two inches above and to the right of the nipple. She remained in this condition for twelve months, when the skin around the base of the mamilla became ulcerated, and discharged a thin and fetid fluid. Excessive pain of a darting and cutting nature manifested itself at the same time, and had continued ever since, with remissions in severity. She stated that the original tumor gradually disappeared, and that small lumps, "like peas," made their appearance in the skin to the inner side of the affected breast, and extended to the left breast nine months ago. The entire anterior surface of the thorax looked as if it had been converted into an irregular fungous mass, covered here and there with drops of blood and yellowish pus. On closer inspection, however, the red and prominent nodules and bosses were seen to be free from the ordinary appearances of fungus, their surface being, for the most part, merely excoriated or fissured, while some were covered by crusts. To the touch they were firm, and somewhat elastic and tender. Varying in size from a small shot to an orange, they were multiform, convex on both surfaces, and inseparably connected with the chest. The discharge was profuse, and had a sickening odor. Some of the nodules showed distinct evidence of cicatrization of the superficial ulcers in the form of a thin epithelial covering, while one was sloughing off. The original breast and

which extend beyond the middle line of the chest, involve the opposite breast, ulcerate, produce great suffering, and finally convert the front and sides of the thorax into a mass of offensive disease. Under these circumstances, the tubers need only undergo atrophic changes to constitute the affection known as cancer en cuirasse, which is met with once in every fifty-one cases. When withering does not ensue, the affection is termed lenticular cancer by Schuh, and pustular or disseminated scirrhus by Velpeau, and the disease may even extend to the neck, shoulder, arm, abdomen, and back. In other cases, by the union of the nodules with the main tumor, and by their progressive growth, the breast is converted into a large bossed mass.

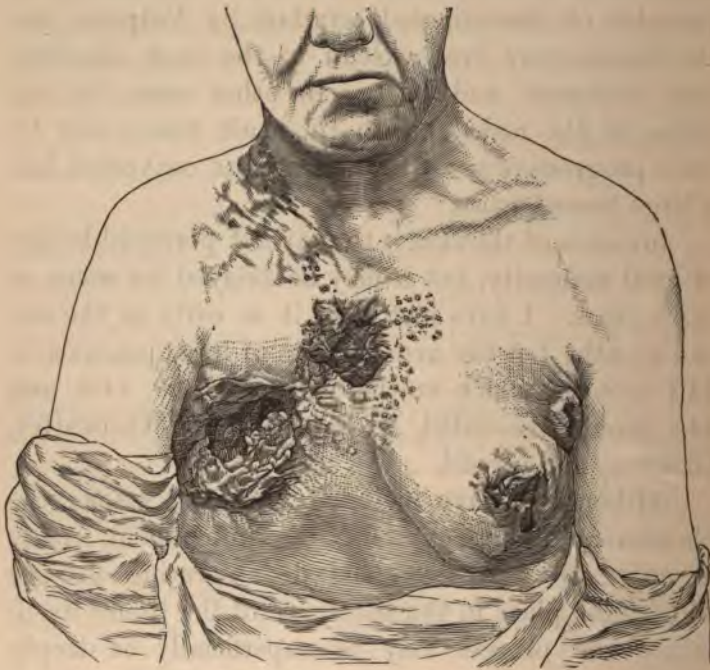
Invasion of the skin is the earliest perceptible sign of local malignity, but it may be delayed for seven or eight years. I have met with it as early as the second month; but the average date of its appearance is 14.1 months, which is the mean of 13.9, 14.4, and 14.2 months recorded, respectively, by Winiwarter, Oldekop, and myself.

Although I have included ulceration among the phenomena of infection of the integument, many ulcers result from fatty and disintegrating changes which take place in the substance of the tumor itself. Hence the process may be superficially or deeply

tumor were converted into a large, red, thin, adherent cicatrix. Of the left breast nothing remained except its lower half with the deformed nipple. Three small nodules of carcinoma were seated in the skin over the summit of the left shoulder, and were quite independent of the main mass. The supraclavicular glands of the right side were contaminated, and a cluster of hard glands, as large as an egg, occupied each axilla. The woman's general condition was excellent.

seated. In the former event, as is seen in fig. 26, the thinned and discolored skin is at first cracked, fissured, excoriated, or eroded, and covered by thin crusts. Ere long a sore forms, which has a pale granulating base, and discharges a thin, offensive fluid. Now and then it heals over, the cicatrix being thin, tense, red, and traversed by small vessels ;

FIG. 27.



LOCAL DISSEMINATION AND ULCERATION OF SCIRRHOUS CARCINOMA.

or healing occurs in the first breach of continuity, while the ulceration continues to spread. In the second form of sore, or that which ensues from the breaking down of the tumor, there is, as is delineated

in fig. 27,¹ a deep, excavated, or crater-like cavity, with irregular, discolored, full, indurated, and everted edges, and a base which is usually formed of hard granulations, and which discharges a puriform, bloody, foul, or ichorous fluid.

The ulcer of carcinoma differs from that of the other mammary neoplasms. In myxoma and sarcoma especially, the sore may be deep and excavated, and its walls composed of disintegrating tumor tissue; but the ulcer of the simple growths is essentially a fun-

¹ From a married and prolific female fifty-two years of age. The disease was of two years' duration, was traceable to heredity and trauma, and was first noticed two years after the menopause as a small tumor beneath the retracted nipple of the right breast. In four months there was a thin and bloody discharge from the mamilla. The glands of the corresponding axilla were enlarged in ten months, and, in twelve months, along the posterior border of the sternomastoid muscle and in the supraclavicular fossa. At the same time a nodule appeared in the skin of the upper sternal region. In fifteen months the disease had disseminated itself in the form of small nodules in the skin over the greater part of the right chest, a tuber appeared in the left mamma, and the left axillary glands enlarged. In seventeen months, the sternal, left mammary, and left axillary tumors ulcerated spontaneously. Her health had failed during the last six months. She was frequently nauseated, and vomited after meals; the appetite was poor; and she suffered great pain in both breasts, the neck, and the right arm.

As a result of caustic applications the right mamma and a portion of the axilla were replaced by a huge, irregular, deep, funnel-like ulcer, with everted, indurated edges, showing here and there evidences of cicatrization, and a granulating surface, which bled readily on changing the dressings. The mass over the sternum consisted of two large, hard, and red tubers above, and of a superficial ulcer below as large as a silver dollar. The outer half of the left breast was converted into a densely hard tumor, which was ulcerated around and at the outside of the nipple, the latter of which was partially destroyed. The skin was infiltrated, below and at the outer side, by flattened plates of carcinomatous material. The glands of the left axilla formed a dense, round tumor, as large as a small apple, and the skin was superficially ulcerated, the edges of the sore being excessively hard and livid. The integument of the sternal border of the left mamma, around the sternal growth, and over and below the right clavicle, was occupied by numerous shot-like and lenticular deposits, a few of which were as large as a filbert. The supraclavicular glands and the glands beneath and over the right sterno-mastoid muscle were converted into secondary tumors.

gating one; that is to say, it is attended with the protrusion of pedunculated masses, which are not attached to the sides of the ulcer. The edges of the ulcer are, moreover, smooth, even, and free from discoloration and infiltration. Although carcinoma is said to throw out fungous masses, I fancy that the statement is traditional, as I cannot find a single example confirmed by minute examination.

I have witnessed ulceration as early as the ninth month, but it usually declares itself, on an average, at 20.2 months. Winiwarter fixes the mean date of its appearance at 17.7 months, Oldekop at 26.4 months, while my cases averaged 16.6 months.

Of the signs of local infection the next in order of frequency is invasion of the deep tissues, as indicated by infiltration of the pectoral fascia, or the dissemination of distinct nodules in the pectoral and intercostal muscles and the ribs, which corresponds to the fixation or adhesion of the tumor to those structures. Of 315 cases, in which this point is noted, the mamma was mobile in 247, and more or less closely adherent in 68, or 21.58 per cent. In the latter class of cases, distinct nodules were also found, on operation, in 1 case out of every $14\frac{1}{6}$ in the pectoral muscles, in 1 out of every $73\frac{3}{8}$ in the intercostal muscles, and in 1 case out of every $35\frac{3}{4}$ in the ribs.

Immobility of the tumor on the subjacent tissues is witnessed, on an average, in 22.6 months, which is the mean of 22.7, 23.4, and 21.9 months recorded, respectively, by Winiwarter, Oldekop, and myself. Hence it will be observed that fixation of the growth ensues 8.5 months after adhesion to the skin, and 2.4 months after ulceration. It, moreover, usually coex-

ists with infection of the lymphatic glands, the presence of which may be suspected, if they cannot be felt, whenever fixation of the tumor declares itself.

Among the more uncommon evidences of local dissemination is the invasion of the opposite breast, which is noted in 25, or 3·65 per cent., of 712 cases. It is a late sign, appearing, on an average, at 32·5 months, although it is witnessed as early as four months, and as late as six years. Of 20 cases of which I have the full particulars, in 18 it was preceded by enlargement of the glands; and in 9 of these there were also nodules in the skin, and ulceration was present in the original tumor in 5. In 2 cases there was no glandular involvement, but in both the disease was preceded by cutaneous tubers and by ulceration of the primary growth.

From the preceding facts we learn that carcinoma evinces a remarkable disposition to infect the adjacent tissues, and that it progresses at first toward the surface. The skin is invaded in 68·92 per cent.; deep attachments ensue in 21·90 per cent.; and the opposite breast suffers in 3·65 per cent. of all instances. The occurrence of local dissemination is, moreover, indicated by the formation of circumscribed nodules in the skin in 10·61 per cent., in the subcutaneous connective tissue in 8·39 per cent., in both of these situations, as in the cuirass form of cancer, in 1·95 per cent., in the pectoral muscles in 7 per cent., in the intercostal muscles in 1·35 per cent., and, finally, in the ribs in 2·8 per cent. In the order of the date of their appearance we may look for extension to the superficial fascia and skin in 14 months, for ulceration in 20 months, for fixation to

the chest in 22 months, and for invasion of the second breast in 32 months. These facts have an important bearing upon the question of operation, to which reference will again be made under the head of treatment.

The reproduction of carcinoma in the associated lymphatic glands is one of the most practically interesting of its malignant features, and exerts a decided influence upon the course of the disease, upon the formation of metastatic deposits, and upon the final issue after operative procedures. As I have already stated, the loose collections of cells are partly contained in the lymph spaces of the mammary gland; and, as these are the radicles of the lymphatic vessels one can readily

FIG. 28.



CARCINOMA OF THE MAMMARY GLAND, THE GROUND SUBSTANCE OF WHICH IS STAINED WITH NITRATE OF SILVER.—*a, a*, Alveoli of the carcinoma filled with cells. *b, b*, Lymph spaces. *c*, Lymphatics, showing silver staining of the endothelium.

conceive, as is so well illustrated by fig. 28 from Cornil and Ranvier, how easily, and, indeed, how inevita-

bly, the young epithelial elements are transported to the lymphatic glands in the axilla and above and below the clavicle, where they implant themselves, proliferate, and reproduce the likeness of the parent growth. When the glands are contaminated, they delay for a certain period, on the one hand, metastatic deposits, and, on the other hand, constitute new foci of local and general infection. Hence the cells of a packet of indurated and enlarged glands behave precisely like the primary tumor; that is to say, they invade the surrounding tissues and infect the adjoining glands and the viscera. Just how often the glands enlarge as a result of inflammatory or irritative hyperplasia, as is witnessed in other mammary neoplasms, I am unable to say; but it is very certain that they are not always carcinomatous, since, as I shall show hereafter, several cases are on record in which they have been left behind during operations, in which they have subsided, and in which the patients were living several years—in one case, indeed, ten years afterward—free from disease.

Out of 657 cases in which it is mentioned, glandular contamination was witnessed in 422, or 64.23 per cent., when the patient first came under observation. In all of these cases the axillary glands were inoculated, and along with these the supraclavicular glands were involved in 27, the infraclavicular in 5, and the cervical in 3.

Carcinomatous degeneration may occur as early as the first month, or may be delayed for seven years. In 55 examples I myself have never witnessed it sooner than four months, nor later than five years, even in cases of atrophying scirrhus. About 1 case in every

4½ is met with in the first six months ; but the average date of its appearance is 15·6 months, or 14·7 months according to Winiwarter, 15 months in my own experience, and 16·5 months in that of Oldekop. Hence it appears one month after invasion of the skin, than which it is only 4·69 per cent. less frequent ; and it is met with before ulceration, deep adhesions, and extension to the opposite breast. In exceptional instances it is even observed before the primary tumor is noticed.

A point of interest, and it is one which must have attracted the attention of every surgeon, is, that the seat of the carcinoma exerts no influence upon the frequency, or the date of the appearance, of the lymphatic tumor. In other words, the glands are not involved earlier or oftener when the original growth is near the axilla, or when it occupies the inner periphery of the mamma.

While it is a well-known fact that the cases uninfluenced by operation, in which the gland contamination does not show itself until late, pursue a more chronic course, and do not perish nearly so quickly as those in which the glands are infiltrated early in the affection, the statistics of Winiwarter and Oldekop show conclusively not only that the chances of removing the entire disease are greatly lessened when the glands are enlarged, but that, as in the former instance, the patients succumb much sooner, and that recurrence is far more rapid. Thus, of 136 subjected to operation, 43 were free from glandular tumors, and their average life from the first observation of the disease to the fatal issue was 52·7 months. Among these patients local reproduction ensued, on an average, in 8

months. Of 93 in whom both the breast and the glands were removed, the mean life was 39·3 months, and the average time of recurrence was 1·9 months. Hence the former lived 13·4 months longer than the latter, and when there was recurrence it appeared 6·1 months later.

The number of glands involved is sometimes enormous, being greater even than the study of normal anatomy leads one to conceive. Thus, from a woman forty-eight years of age, in whom the disease had existed eighteen months, I saw Professor Gross remove, along with the breast, fifty glands, which varied in size from a small shot to a hazel-nut. On her return to the clinic, ten weeks subsequently, the disease was found to have recurred at the edge of the pectoral muscle, in the axilla, and in the supraclavicular glands.

In the majority of instances the glands are separate and distinct. In others they constitute a densely hard, conglomerate, knobby mass; while, now and then, the disease is confined to a single gland, which may, as in a case of my own, measure three inches and a quarter by one inch and three-quarters in its long and short diameters.

After contamination of the lymphatic glands the cells pass into the circulatory system through the thoracic and right lymphatic ducts, are transported to the viscera, the bones, and other tissues, in which they proliferate, reproduce the likeness of the primary growth, and in this way develop metastatic deposits or growths. General dissemination may, however, manifest itself without antecedent glandular infection, but such a course is exceptional. Thus, of 39 post-mortem inspections in which systemic secondary

tumors were discovered, the intervening glands were involved in 34, or 87·17 per cent.; in 2, or 5·13 per cent., there were merely tubers in the skin and pectoral muscle; while in 3, or 7·69 per cent., there were no primary complications whatever. Hence, in about 1 case in every 8, metastasis occurs without contamination of the glands; but it should be remembered that the glands may be overlooked, and that, as happens in medullary carcinoma, the infection may take place through the bloodvessels.

Of the frequency of metastatic deposits our knowledge is most uncertain, for the reason that it is by no means easy to follow our cases or to obtain post-mortem examinations. My own observations in this respect are worthless, as I was enabled to make a section in only one case, it being one of atrophying scirrhus which had lasted for upward of seventeen years, and in which I detected tumors in the lungs, the pleura, the bronchial and mediastinal glands, and the right kidney. The tables of Winiwarter, Oldekop, and Henry, however, contain 39 cases of general dissemination confirmed by section after death, and 44 cases in which that condition was determined by well-marked symptoms during life. They were distributed as follows:

Died without operation	70	Metastases in,	10	Presumed metastases in,	6
Died from the effects					
of operation.....	87	"	8	"	0
Died with recurrence					
after operation.....	217	"	21	"	38
	<hr/> 374		<hr/> 39		<hr/> 44

Hence, of 374 patients, metastatic deposits had formed, or were presumed to have formed, in 83, or 22·19 per cent. As indicated by section, they were

present in 39 out of 78, or precisely 50 per cent. This latter point is interesting, as it denotes that death ensues in one-half of all cases merely from the baneful effects exerted upon the nutrition of the patient without cancerous degeneration of the viscera.

The date at which metastases form varies from five months to eight years.¹ Out of every 100 cases 24 will be found within a year; 3 in from thirteen to eighteen months; 18 in from nineteen to twenty-four months; 27 in from twenty-five to thirty-six months; and 28 after three years. Winiwarter, Henry, and Oldekop compute the average date of death from metastases from the first appearance of the disease, respectively, at 23·7, 31·7, and 38·2 months, so that the general mean is 31·2 months, or 15·6 months after glandular reproduction. The fact of the rare occurrence of visceral deposits between the thirteenth and eighteenth months may be explained by the comparative freedom of the glands from infection at that period.

In the 39 cases² in which sections were made after

¹ The remarkable symmetrical case of Billroth, referred to at page 146, which developed during pregnancy, and ran its course in six weeks, is not included in this computation.

² With a view to determine the relative frequency of the seats of secondary deposits from a larger number of cases, I have obtained the following results by adding to the 39 cases 89 compiled by Mr. H. Arnott, Mr. H. Morris, and Mr. A. Clark, Surgical Registrars to the Middlesex Hospital, whose accuracy cannot be questioned, and published in the *Trans. Path. Soc. of London*, vol. xxvii, p. 264: Thus, of 128 post-mortem examinations, secondary tumors were discovered in the

	Per cent.		Per cent.
Axillary glands in	115 or 89·94	Liver,	in 55 or 42·96
Other glands, "	30 " 23·43	Pancreas,	" 1 " 0·78
Pleura, "	30 " 23·43	Spleen,	" 3 " 2·34
Pericardium, "	3 " 2·34	Kidney,	" 5 " 3·90
Peritoneum, "	3 " 2·34	Adrenal,	" 2 " 1·56
Brain, "	3 " 2·34	Ovary,	" 7 " 5·46
Lung, "	28 " 21·87	Uterus,	" 2 " 1·56
Esophagus, "	1 " 0·78	Bladder,	" 1 " 0·78
Stomach, "	5 " 3·90	Bones,	" 9 " 7·02
Jejunum, "	1 " 0·78	Muscles,	" 2 " 1·56

death, the relative frequency of the seats of the secondary deposits is shown by the following statement:

Dura mater in	3 cases.	Kidney	in	3 cases.
Pleura "	9 "	Adrenal	"	1 case.
Pericardium "	1 case.	Ovary	"	2 cases.
Brain "	3 cases.	Uterus	"	1 case.
Lung "	14 "	Bladder	"	1 "
Œsophagus "	1 case.	Bones	"	4 cases.
Stomach "	4 cases.	Muscles	"	2 "
Jejunum "	1 case.	Bronchial glands	"	3 "
Liver "	20 cases.	Mesenteric glands	"	2 "
Spleen "	1 case.			

While in sarcoma the lungs and the bones are the most common seats of the secondary deposits, the liver being affected only one-half as frequently as the lungs, the digestive organs, the lungs, and the serous membranes are the seats of predilection of cancer; and the liver is attacked 25·41 per cent. more frequently than in the former disease. The liability of the liver to infection, even to a greater extent, has been remarked by other observers, and affords a striking contrast to that of the lungs, which might naturally be expected to be the most frequently tainted.

With the progress of the local and general disease the so-called "cancerous cachexia" is established. This is nothing more than the general failing of the powers, such as is witnessed in many other maladies, attended with loss of blood, offensive and exhausting discharge, and suffering, and is due to the improper performance of the functions of the viscera, and the consequent ill effects produced upon the general nutrition, as indicated by wasting, loss of appetite and strength, nausea, sallowness, and a quick and feeble pulse. As we have just seen, death occurs, as demon-

strated by post-mortem inspection, in an equal number of cases, whether there be visceral deposits or not. The latter succumb from the intensity of the local disease and its effects; the former from the effects of metastases, as indicated by symptoms which denote implication principally of the liver, lungs, pleura, digestive organs, and nervous system.

The foregoing facts, deduced from the morbid changes which ensue in carcinoma, clearly demonstrate that the prognosis of the affection is eminently unfavorable. This statement becomes the more apparent from the study of the cases which pursue a natural course and of those subjected to the knife. In this study are included the duration of life in each class and the influence of the operation on the progress of the disease.

Of 616 cases, 97 ran a natural course, and 519 underwent operation.

Of the 97, 70 were dead, with visceral deposits in 10, and presumed metastases in 6; 13 were still alive in bad condition; and in 14 the fate was unknown.

Of 67 of these in which the date was noted,

30.82 per cent. died in between 5 and 12 months.						
33.72	"	"	"	12	"	24
11.37	"	"	"	24	"	36
9.87	"	"	"	36	"	48
7.91	"	"	"	48	"	60
3.48	"	"	"	60	"	72
1.28	"	died after 6 years.				

The average duration of life was 27.1 months, having been, according to Oldekop, 22.6 months, according to Henry, 26 months, and, according to Winwarter, 32.9 months.

224 died after operation with recurrence of the

disease, and in 21 of these metastases were discovered, and were suspected in 38. Of this number,

10.50 per cent. died in between 6 and 12 months.							
33.00	"	"	"	12	"	24	"
24.03	"	"	"	24	"	36	"
9.95	"	"	"	36	"	48	"
7.91	"	"	"	48	"	60	"
5.04	"	"	"	60	"	72	"
9.51	"	died after 6 years.					

The average duration of life in these 224 patients was 39 months; and the computations of Oldekop, Henry, and Winiwarter are singularly alike on this point, being, respectively, 38.1, 39.3, and 39.6 months. A comparison of the two tables shows that the course of the disease is retarded by the removal of the growth; and a comparison of the two averages indicates that operation adds twelve months to the life of the patient.

Not only is life prolonged by operation, but the removal of the entire breast, along with any infected glands that may be discovered, that is to say, thorough operations, results in permanent recovery in 9.05 per cent. of all cases. As we have already seen, death from metastases occurs at 31.2 months, and the average date of death of those who succumb without or with operation is 33 months. We shall, moreover, see presently that local recurrence of the disease after three years is met with in only one-half of 1 per cent. of all cases. Hence a radical cure may be assumed if the patient has survived the disease over three years without local or general recurrence after the last operation, or if she has died of some intercurrent malady under the same conditions.

Of 519 cases submitted to the knife, 43 were still

living, and 4 had died. Of these 47, recurrent growths were removed in six; and there was freedom from disease after the last operation in

14	for	between	3 years and 2 months and	3 years and 11 months.			
8	"	4	"	"	4	"	6
7	"	5	"	"	5	"	9
3	for	6	"				
4	for	between	7	"	"	7	"
1	for	8	"	and 9 months.			9
2	for	between	9	"	"	6	"
2	"	10	"	"	9	"	10
2	"	10	"	"	10	"	10
2	"	11	"	"	11	"	9
1	for	12	"				
1	"	13	"	and 8 months.			
1	"	14	"	"	7	"	
1	"	15	"	"	7	"	

The average time of cure was 5 years and 9 months, and the disease had existed before operation, on an average, for 18.4 months. The cases were not selected in order that the best possible results might be obtained, since I find that, of 44 in which the nature of the operation is noted, the mamma was entirely removed and the axilla was cleared out in 18, and the breast alone was amputated in 26, although, in three of these, enlarged glands were left intact in the axilla, and yet the cure was assured at the end, respectively, of 5 years and 9 months, 6 years and 1 month, and 10 years and 10 months. The practical deductions which can be gathered from such data are so clear that they do not require comment.

As a further proof of the influence exerted upon the duration of life by radical operations, attention may be called to the fact that nearly one-third were free from disease after the lapse of six years; while, of the 67 patients in whom no operation was practiced, only one survived after that period.

Sir James Paget,¹ in speaking of the duration of life after operation, says: "I am not aware of a single clear instance of recovery—of such recovery, that is, as that the patient should live for more than ten years free from the disease." Applying this severe test, an examination of the table will show that rather more than 1 in 6 fulfils this condition. It must, however, be borne in mind that at the time he penned his words the influence of the writings of the late Mr. Moore,² of the Middlesex Hospital, had not been felt in England, whereas the latter surgeon's practical conclusions were fully carried out in Germany, Denmark, and Austria.

In addition to the 47 permanent cures after operation, 43 cases were alive without recurrence from the last operation for a period which varied from 3 weeks to 3 years, or 13·2 months on an average.

If the patient survives an operation, local recurrence of the disease may be looked for. Of 519 operations, 87 died from its immediate effects, thereby leaving 432 cases for the consideration of the question of local reproduction. Of these cases, 64 are devoid of further history, having been lost sight of immediately after recovery; so that of 368 patients

90 were cured, but 18 had had recurrences.

31 were alive with recurrence.

23 had recurrence, but further details are wanting.

158 died with recurrence, but with no evidence of metastases.

38 " " " and with presumed metastases.

21 " " " " " actual metastases.

7 " " " but the question of metastases is doubtful.

¹ *Op. cit.*, p. 649.

² On the Influence of Inadequate Operations on the Theory of Cancer.—*Med.-Chir. Trans.*, vol. xxxii, 2d ser., 1867, p. 245.

It will thus be perceived that the tumor reproduced itself locally in 296, or 80·97 per cent., after 368 operations, a fact which accords with the infiltrating nature of the disease, as observations during life and during operative procedures, as we have previously seen, demonstrate infection of the superficial and subjacent tissues in 90·82 per cent. of all instances.

In 203 cases, analyzed by Winiwarter and Oldenkop, the periods of recurrence were as follows :

		Within 15 days		in 39 cases.	
		" 1 month		" 50 "	
From end of 1st	to end of 3d	" 38 "			
" beginning " 4th	" " 6th	" 18 "			
" " " 7th	" " 9th	" 16 "			
" " " 10th	" " 12th	" 19 "			
" " " 13th	" " 18th	" 9 "			
" " " 19th	" " 24th	" 6 "			
" " " 25th	" " 30th	" 3 "			
" " " 31st	" " 36th	" 3 "			
After 3 years				" 2 "	

The table shows that more than one-half, or 63 per cent., of the recurrences took place in 3 months, while after 12 months there were only 23, or 11·65 per cent., and of these there were only 2 after 3 years. The average period for all cases is 5·3 months. The cases of local reproduction within the first quarter of a year were doubtless examples of continuous growth, rather than of recurrence, and merely indicate that the original disease was not thoroughly removed. They, moreover, lead to the belief that, if recurrence does not ensue in that time, the chances for the patient are relatively good, and that the prognosis is all the more favorable as the period of freedom from signs of local contamination prolongs itself. The exceptional

cases prove the rule that the patient is safe from reproduction after 3 years from the date of operation. When studied with regard to gland complications, the cases show, contrary to the generally received opinion, that total extirpation of the breast alone is followed by recurrence, on an average, in 3.1 months, and that it ensues, on an average, in 7.5 months after amputation of the mamma with the diseased axillary glands. This point, with the one previously mentioned, namely, that recurrence in the axilla is far more frequent after removal of the breast alone than when the glands are simultaneously removed, demonstrates that the wiser course is to explore the axilla, even if its glands cannot be detected from without.

In 194 cases, in which the point is noted, the recurrent local disease was seated

	Per cent.
In the cicatrix, remains of mamma, or vicinity, alone in 112, or	57.72
" " " " " " " and glands " 48, "	24.74
" " glands alone " 28, "	14.43
" " opposite breast " 6, "	3.09

Its locality, as influenced by the operation practiced in 117 cases, was as follows:

1. Partial or total extirpation of the mamma without the glands, 47 cases.
 Recurrence in or near the cicatrix, 23 cases, or 48.93 per cent.
 " " the glands alone, 9 " 19.14 "
 " " cicatrix and glands, 15 " 31.91 "
2. Amputation of the breast with extirpation of the glands, 70 cases.
 Recurrence in or near the cicatrix, 48 cases, or 68.57 per cent.
 " " the glands alone, 5 " 7.14 "
 " " both places, 17 " 24.28 "

It will thus be seen that the axilla was far more frequently the seat of recurrence, or rather spread, of the disease, after extirpation of the breast alone, than

when the glands and breast were both removed. Hence, by clearing out that cavity in all operations, we may naturally expect to diminish, if not prevent, further local dissemination, and remove foci of general infection.

A review of the facts contained in the preceding pages in regard to the prognosis of carcinoma, or the duration of life, as influenced by permitting the disease to pursue its course without surgical intervention, or by endeavoring to stay it by a resort to the knife, leads us to adopt the following conclusions :

That when left to itself carcinoma inevitably kills, by its baneful consequences as a local disease, or by its remote multiplication.

That about one in six, or 16·77 per cent.,¹ of the patients die of the operation itself ; but that the risk is not so great as to forbid interference, since it adds twelve months to the life of the patient.

That thorough operations definitely cure 9·05² per cent. of all patients, or more than half as many as it destroys.

That the patient is safe from reproduction if three years have elapsed since the operation ; and,

That, finally, recurrence may be delayed for several months, or be prevented altogether, by clearing out the axilla at the same time that the entire breast is removed.

The diagnosis of carcinoma of the breast in its early stages, or before there is implication of the sur-

¹ The mortality is excessive, because a very large proportion of the operations were radical.

² Or, if we deduct 64 patients, of whom nothing further is known, the cures reach 10·32 per cent.

rounding tissues and the lymphatic glands, is based upon the age of the patient, the average being forty-eight years, the dimpling of the skin, the retraction of the nipple, the immobility of the solitary tumor in the mamma, or, if it be seated at the periphery, its intimate attachment, its nodular outline, its small size, its slow growth, and its stony hardness; and the diagnosis is strengthened if there be a history of heredity, and if there were antecedent discharge from the nipple and eczema or psoriasis of that body. When the disease has made some progress, or after the thirteenth month of its existence, the adhesion and invasion of the skin, the enlargement and induration of the associated lymphatic glands, the occurrence of ulceration and fixation to the chest, and the impaired nutrition of the patient, constitute a group of signs which cannot be mistaken.

From this general course of carcinoma there are certain deviations which may be ascribed to histological peculiarities, since the following study of medullary, colloid, and atrophying cancer shows that the intensity of the disease is modified by structural aberrations. All of these varieties possess certain features in common, but the different degrees of malignity are sufficiently pronounced to warrant a separate examination of their individual characteristics; and this is the more necessary, as the medullary and colloid forms are usually confounded with medullary sarcoma and medullary myxoma.

MEDULLARY CARCINOMA.—Medullary, or tuberos, carcinoma, as it is denominated by Birkett and Bry-

ant, is described by most authors as being enclosed in a distinct capsule; and they distinguish it from ordinary cancer by its occurrence at a comparatively early age, by its more rapid growth and larger volume, by its soft consistence, by the marked enlargement of the subcutaneous veins, by the natural state of the nipple, by the rare and late adhesions and contamination of the lymphatic glands, by the frequent formation of ulcers which protrude bleeding masses beyond the surrounding level, and by its very rapid course.

While it is true that some of these statements are correct, it is very evident that the life history of medullary carcinoma is lost in that of medullary sarcoma. Medullary carcinoma is never encapsuled, and the presence of a limiting envelope is, of itself, sufficient to decide against it. The following account of its general pathology is based upon a study of 22 cases, derived from various sources.

It occurs as early as 29 and as late as 69 years, the average being 50. 20 per cent. of all cases are met with before 40, and 80 per cent. after that age; while exactly one-half occur after 50.

Medullary carcinoma grows rapidly, and the volume of a child's head in three, five, six, or eight months, or even in five, six, or eight weeks, is not uncommon; but it never attains the bulk which is sometimes witnessed in sarcoma. Its consistence is soft and elastic, or even fluctuating, so that it may be mistaken for an abscess, in 66.66 per cent. of all cases. In the remaining third the tumor is hard, or firm, with a certain degree of elasticity. Like sarcoma, but unlike ordinary cancer, its outline tends to lobulation.

The subcutaneous veins are prominent in 9.09 per cent. of all cases, and the nipple is retracted in 33.33 per cent.

The lymphatic glands are infected in 59.02 per cent., and their taint may show itself as early as three weeks, or may be absent for nearly five years.

The skin is discolored and adherent in 52.92 per cent., and it also contains distinct nodules in 5.88 per cent. of these cases. Ulceration is met with in 18.18 per cent., and the sore is deep and excavated, and liable to hemorrhage, but it does not fungate.

The tumor is fixed to the chest in 29.41 per cent. of all instances, and in 11.76 per cent. of these circumscribed tubers exist in the pectoral muscles. Both breasts are affected in 9.09 per cent. of all cases.

Of the four cases that ran a natural course, all were dead, on an average, in eight months from the first appearance of the disease, the period having been, respectively, five weeks, six weeks, five months, and two years. Post-mortem inspection in two cases disclosed metastatic tumors in the lung and pleura in one, and in the thyroid gland, pericardium, liver, omentum, and kidney, in the other.

Four died from the operation itself. The average life was twenty-seven months, and the only post-mortem examination that was made showed deposits in the liver and pleura.

Of nine patients who died with local recurrence after operation, the average life was sixteen months and a half, and the tumor reproduced itself in three months on an average. In the single post-mortem section, the liver, stomach, and ovary were found to be occupied by secondary growths. Three cases

were subjected to the knife; but further details are wanting. Their average life, up to the date of operation, was twenty-two months and a third.

Finally, two were cured; that is, they remained well and free from recurrence, respectively, for four¹ and five² years after surgical operation. In the first case the breast was amputated, and the enlarged axillary glands were extirpated; while in the second the breast alone was removed, there having been no primary complications.

From the foregoing account it follows that medullary carcinoma is the most malignant of all the tumors of the mamma, since local recurrence ensues within three months after removal in 81.81 per cent. of all cases; metastatic growths are always discovered on post-mortem inspection, and are preceded by taint of the glands of the axilla in three-fourths of the instances; and the total duration of life without surgical intervention is only eight months. Life may be doubled, however, and a positive cure result in 18.18 per cent. of all cases, by an early resort to the knife, even if the axillary glands are extensively contaminated.

The distinction between medullary carcinoma and medullary sarcoma may be made by paying attention to the following points in their affinities and contrasts.

Medullary sarcoma occurs, on an average, eight years earlier, is more common before the fortieth year by 33 per cent., and is even seen as early as the age of sixteen. The subcutaneous veins are enlarged

¹ Henry, *op. cit.*, case 27.

² Satterthwaite and Porter, *Observations in One Hundred Cases of Carcinoma*, Reprint, New York, 1879, p. 96.

5.19 per cent., and ulceration occurs 3.24 per cent. more frequently, and the tissue of the tumor invariably protrudes through the sore. The skin adheres in 24.35 per cent. less of cases, while the nipple is never retracted, nor are the axillary glands ever contaminated. Its course is far more chronic, and it may last five or six years before removal is demanded. The average life without operation is 7 months, and with operation, 30 months, or $13\frac{1}{2}$ months longer than in medullary carcinoma. Local reproduction is witnessed in 61.33 per cent., and metastases in 57.14 per cent., against 81.81 per cent. and 100 per cent. respectively, for medullary carcinoma.

COLLOID CARCINOMA, as based upon a critical analysis of 13 cases, is distinguished by its chronic course, by the late and infrequent degeneration of the glands, by its freedom from recurrence, and by the protracted appearance of metastatic deposits, features which make it the least malignant of the cancers. Its comparative immunity from local and general dissemination may be ascribed to the biological changes in its cells, the greater portion of the protoplasm of which is converted into colloid material, which acts the part of an intercellular substance and prevents or retards the migration of the cells into the adjacent tissues and their transference along the lymphatics to the associated glands and the viscera.

It is met with as early as 28 and as late as 66 years, the average being 45; 76.93 per cent. occur after the fortieth year, and 46.15 per cent. after the age of fifty.

It increases very slowly, and the volume of a fist

is exceptional, that of a hen's egg being the rule, and it may require fourteen years to attain that size.

Its consistence is hard, only 7.69 per cent. being soft and elastic, and then only at the more prominent bosses. Its outline is nodular or bossed.

The subcutaneous veins are somewhat prominent in 23.07 per cent. The nipple is retracted in 30.72 per cent., and discharges a bloody fluid in 15.36 per cent. The glands are contaminated in 23.07 per cent. In the three cases in which that point is noted, the disease had lasted in two for twelve years, and in one for twenty-four months. In the ten in which the glands were normal, one had existed for ten, and another for fourteen years, the average being three years and a half. Of the five cases that were living without recurrence, in not a case was there antecedent glandular or other complication, while in the two that died with metastatic deposits death was preceded by glandular implication.

The skin is adherent in 23.07 per cent., and it also contains distinct nodules in one-third of these. Ulceration is met with in 15.38 per cent. The tumor is fixed to the chest, and the pectoral muscles are pervaded by tubers, in 15.38 per cent.; and both breasts are involved in 15.38 per cent.

Of the two cases that ran a natural course, both died at the end of twelve years from the first observation of the disease, and in both the glands were tainted. In one recorded by Doutrelepon,¹ the entire skin of the chest was pervaded by nodules, thereby constituting cancer en cuirasse, and secondary deposits were

¹ *Langenbeck's Archiv*, Bd. xii, p. 551.

found in the pleura and lungs. In the second case, section disclosed metastatic tumors in the pleura, lungs, bronchial glands, mediastinum, and diaphragm.

In one death occurred from the consequences of the operation. There was no section, but the disease had existed for ten years.

In five there is no further history after operation, but the tumor had existed, on an average, for two years and a half.

In five cases the patients were still alive and free from recurrence; in three, respectively, for 13, 19, and 20 months, and the disease had existed, on an average, for five years before operation; and in two¹ there was no recurrence in 3 years, and in 5 years and 10 months, and the disease had existed, on an average, for nine months before surgical intervention. Hence these cases may be regarded as cured.

From these facts it will be seen that, although the disease requires twelve years to run its course when uninterrupted by operation, it is impossible to calculate what effect operation has on prolonging life. The most that can be said is that, in the cases in which the history is complete, the patients were still living upward of thirty-one months after operation, and that the disease had existed previous to operation forty months.

The only tumor for which colloid cancer is liable to be mistaken is myxoma, and the differences between them are now and then so slight that the determination of them from their clinical features, it must be confessed, is by no means easy.

¹ F. E. Schulze, *Max Schultze's Archiv*, Bd. i, p. 336, and Satterthwaite, *op. cit.*, p. 98.

Their affinities and contrasts are as follows :

Myxoma is met with 8 per cent. more frequently before the age of forty, and 17 per cent. less frequently after fifty, although the average age of occurrence does not materially differ in the two affections.

Myxoma is soft in 40 per cent. more of cases, and it grows more rapidly and attains a greater volume than colloid carcinoma. In the former the subcutaneous veins are never prominent, and the nipple is retracted, and the axillary glands are enlarged less frequently, respectively, by 16.44 per cent., and 8.79 per cent.; but invasion of the skin and ulceration are more common, respectively, by 34.07 per cent. and 13.69 per cent., although it is not attended with deep adhesions or extension to the pectoral muscles. While reproduction after operation is not met with in colloid carcinoma, it occurs in 33.33 per cent. of all cases of myxoma; but metastatic tumors are not met with in the latter. The average duration of life of those living after operation is 54 months for myxoma against 71 months for colloid cancer. Hence the history of colloid carcinoma shows that it is a relatively benign growth.

ATROPHYING SCIRRHUS.—Withering, or atrophying, scirrhus is usually stated to be a disease of more advanced life, and to pursue a milder course than the other forms of carcinoma, as regards glandular and visceral participation; and these assumed attributes are said to arise from its tendency to result in a natural cure. While it is certainly true that the older portions of the tumor do undergo cicatricial contraction and atrophy, it is none the less true that, so

far from nature effecting a cure, the surrounding tissues are simultaneously being invaded to a far greater extent than is met with in any other variety of cancer, and that local reproduction after extirpation is constant. In point of fact, withering scirrhus evinces signs of local and general extension to so wonderful a degree that post-mortem inspection has never failed to disclose visceral deposits; and, as I have just stated, recurrence is invariable. The recurrent disease is, moreover, more intense than in any other cancer, taking place in three-fourths of all instances during or soon after cicatrization, and showing itself in the glands, and as tubers in the skin, subcutaneous connective tissue, and pectoral muscles. In one case, indeed, the entire course of the disease was only seven months, and two operations for recurrence, the second having been a most extensive one, were practiced. In one case of death from operation, secondary deposits were found in the liver, and the disease had existed only five months in a woman of fifty-five years. In still another example, in which the disease developed at the forty-fourth year, on death without operation in one year metastases were found in the lungs, pleura, and liver. From a study of seventeen cases, which include two of my own, I can find nothing to confirm the idea that the course of the disease is more rapid when it develops early than late in life.

Although patients may live with the disease many years, even for a quarter of a century, they none the less surely die from its effects, and, the longer it lasts, the more liable are the adjacent tissues, glands, and the viscera to extensive infection. Thus I have re-

corded a case,¹ the structural features of which are represented in fig. 20, in which the tumor first showed itself at the age of forty-six years, and, on death seventeen years later, the skin of the corresponding mammary and scapular regions, and of the opposite breast, and at the base of the xiphoid cartilage, was pervaded by lenticular nodules; the axillary portions of the pectoral muscles were converted into densely hard masses; the glands of the corresponding axilla and supraclavicular fossa and of the left axilla were enlarged and indurated; and both lungs, the pleura, the bronchial and mediastinal glands, and left half of the diaphragm, and one kidney, were beset with metastatic deposits. In a second case, the external features of which are shown in fig. 29, and the minute appearances of which are depicted in figs. 18 and 21, I recently removed, on account of excessive suffering, a tumor of fourteen years' duration, which had commenced at the age of thirty-one. Not only was the pectoral fascia itself infiltrated, but the subjacent muscle was so extensively occupied by nodules as to demand the removal of its larger portion. The axillary glands formed a densely hard tumor, which extended up under the clavicle, and, as it was intimately attached to the axillary vessels and nerves, I was obliged to leave a portion in the wound.

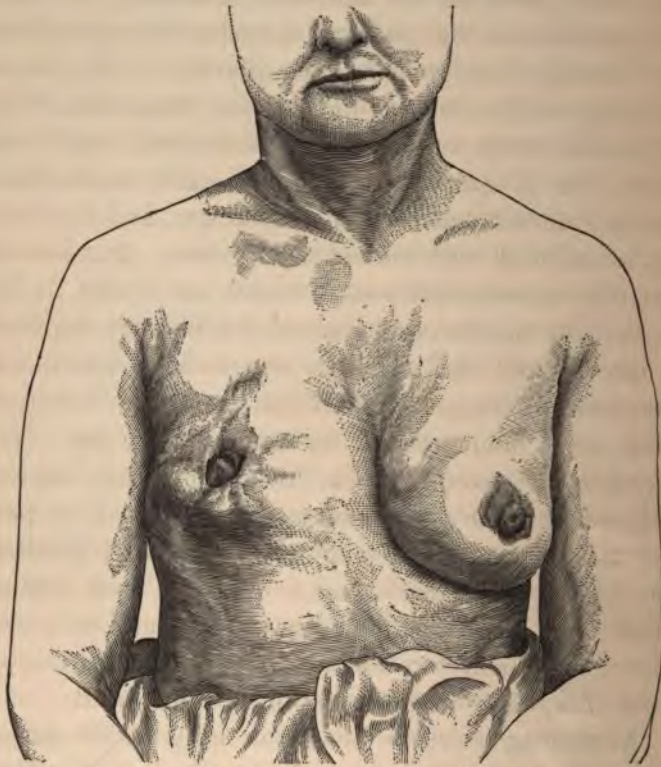
Withering scirrhus occurs as early as 29 and as late as 65 years, the average being 47, or earlier than the other varieties of carcinoma, except the medullary; 23·5 per cent. develop before the fortieth year, and 76·5 per cent. after that age, of which more than one-half occur after the age of fifty.

¹ *Philadelphia Medical Times*, vol. viii, p. 84.

Its consistence is densely hard, its volume is exceedingly small, and its outline is nodular, knotty, and irregular.

The subcutaneous veins are never enlarged; but the nipple is always retracted.

FIG. 29.



ATROPHYING SCIRRHUS OF THE RIGHT MAMMARY GLAND.

The lymphatic glands are infected in 52·94 per cent. of all cases; and their implication invariably precedes metastases.

The skin is adherent in 58·82 per cent.; contains

nodules in 17·64 per cent.; and is ulcerated in 41·17 per cent. of all instances.

The tumor is fixed to the pectoral fascia, and in the majority of cases closely, in 39·29 per cent.; and nodules are disseminated in the pectoral muscles in 57·14 per cent. of all cases. The opposite breast is invaded in one case out of every seventeen.

Of eight cases that pursued a natural course, four were living, their average life having been 14 years and 9 months; and four were dead, their average life having been 6 years and 10 months. In two of these cases post-mortem examinations were made, and they disclosed metastases in the lungs, pleura, and liver, in one; and in various organs, as I have indicated above, in a case of my own.

Of nine cases that underwent operation, one died of its consequences; the total duration of the disease was five months, and secondary tumors were found in the liver. Three died with recurrence, and their average life was nineteen months; one was still living with extensive local recurrence, four years and a third having elapsed since the first observation of the disease. Four recovered; but their histories end with that statement, and their average life was four years and ten months.

Hence, in the cases in which the histories are complete, recurrence of the disease was invariable; and metastatic tumors were found in every case in which the body was opened after death. In point of malignity, therefore, although its course is essentially chronic, atrophying scirrhus is the most pernicious of the tumors of the breast.

With the view of comparing the several char-

acteristics of the varieties of carcinoma, I have drawn up the principal points in the history of their lives, in the following table, which will be of service in determining their diagnosis, prognosis, and fitness for operation. Under fibrous are included ordinary and simple scirrhous, as they pursue precisely the same course, as well as a few cases of other forms of carcinoma; but the latter constitute so small a proportion of the entire number that the percentages would scarcely be changed if it were possible to separate them. As the column contains the results of my analysis of the tables of Winiwarter, Oldekop, and Henry, and of my own one hundred cases, and corresponds to my general description of the disease, those of my readers who desire to be more exact may change the heading to carcinoma in general. The metastases are based upon post-mortem inspection alone, and the cures upon freedom from local or general recurrence for three years after the last operation.

	Fibrous.	Medullary.	Colloid.	Atrophying.
Average age.....	45 years.	50 years.	45 years.	47 years.
Consistence.....	Never soft.	Soft in 66 p. c.	Partly soft in 7·62 p. c.	Never soft.
Veins prominent.....	2·08 p. c.	9·09 p. c.	23·07 p. c.	0 p. c.
Nipple retracted.....	52 "	33·33 "	30·72 "	100 "
" discharging.....	9 "	0 "	15·85 "	0 "
Glands infected.....	64·23 "	59·02 "	23·07 "	52·94 "
Skin adherent.....	54·54 "	52·92 "	23·07 "	58·82 "
Nodules in skin.....	10·61 "	5·83 "	7·69 "	17·64 "
Ulceration.....	23·77 "	18·18 "	15·38 "	41·17 "
Fixation to chest.....	21·58 "	29·41 "	15·85 "	35·29 "
Nodules in pectoral muscle.	7·06 "	11·76 "	15·85 "	57·14 "
Both breasts.....	3·65 "	9·09 "	15·38 "	5·88 "
Av. life without operation.	27·1 mos.	8 mos.	144 mos.	82 mos.
" " with ".....	39 "	16½ "	?	18 "
Local reproduction.....	80·97 p. c.	81·81 p. c.	0 p. c.	100 p. c.
Metastatic deposits.....	50 "	100 "	100 "	100 "
Cured.....	9·05 "	11·11 "	18·18 "	0 "

CHAPTER X.

CYSTS.

A cyst may be defined to be a sac filled with more or less fluid contents. When the accumulation takes place in the secreting structures of the mamma, the connective tissue membrane which forms the wall of the cavity is lined by epithelium, whereas it is merely a fibrous capsule when it is a new formation.

The usual nomenclature of cysts is entirely artificial, as it is based upon the nature of their contents, a classification, it need scarcely be said, which affords no clue to the mode of their origin. In accordance with their derivation they may be separated into retention cysts and cysts of new growth, the latter including membranes which limit hydatids, and possibly a fibrinous coagulum, as in the examples recorded by Schuh¹ and Gay.² As I have been unable to refer to the original paper in the one, and as the description is very defective in the second case, I am, however, in doubt whether the blood was originally contained in a dilated duct, or extravasated into the periglandular connective tissue, and subsequently enclosed in a fibrous wall, although the former origin is the more plausible. In addition to these, Albers³ has

¹ Klebs, *Hdbch. der Path. Anat.*, p. 1197.

² *Boston Med. and Surg. Jour.*, 1878, p. 90.

³ *Erläuterungen*, Bd. iii, p. 589.

described a dermoid cyst containing hair and sebaceous matter, and supposed sebaceous cysts have been removed by Gerdy,¹ Lawrence,² and Dieffenbach;³ but they were probably nothing more than inspissated lacteal cysts, and need not detain us.

1. RETENTION CYSTS.

When from any cause whatever the lacteal ducts are obstructed, constricted, or obliterated, the glandular apparatus behind the lesion is converted into a sac through retention and accumulation of its secretion. As the surrounding stroma is not concerned in their formation, these cysts are to be carefully distinguished from the softening cysts which are of not infrequent occurrence in the neoplasms properly so called, and from the duct cysts which are so commonly found in connection with fibroma, sarcoma, and myxoma. The former constitute cystoid, and the latter cystic tumors, while the affection under consideration is known simply as cyst of the mamma.

For convenience of description retention cysts may be divided into the simple, which comprise the serous, mucous, sero-sanguinolent, and hematic; and the lacteal, which include the oil and butyroid cysts of various authors. Their occurrence is so rare that, as I have already pointed out at page 9, they constitute less than 2 per cent. of all tumors of the breast.

A. Simple Cysts.—Retention and accumulation of the secretion and consequent ecstasia of the lacteal

¹ Velpeau, *op. cit.*, Syd. ed., p. 247.

² *Ibid.*, p. 248.

³ Lebert, *Bull. de la Soc. Anat.*, 1852, p. 42.

glands and their ducts may arise from malformation of the nipple; from inflammation due to injury or puerperal mastitis; from the presence of small vegetations in the ducts;¹ from cicatricial contraction of the fibrous stroma of the mamma; and, it may be, from errors of development during the unfolding of the gland after the establishment of the menses, through which, as Meckel suggested, the lobules form more rapidly than the ducts. In accordance with the period of their development they may be separated into involution and evolution cysts, the former appearing after, and the latter before, the menopause.

a. Involution cysts, or those which occur in the atrophying or obsolescent gland, are directly traceable to dilatation principally of the acini, as may be demonstrated by minute examinations of sections made from their immediate vicinity. In a careful study of two specimens, I found that the sclerosed and contracting fibrous tissue not only strictures the ducts, but also induces irritative hyperplasia of the epithelium, as indicated by its proliferation and accumulation in the acini. The cells then undergo regressive changes, through which they are converted into a lactescent or mucoid fluid, so that a single acinus appears as an enlarged round or ovoid cavity, surrounded by its proper membrane, which is lined by a single layer of cuboid or cylindrical cells. As a rule, all the acini of a lobule participate in these alterations; and the cyst increases in size by the fusion or coalescence of the contiguous acini, as is frequently shown by the projection of the remains of the septa, in the form of irregular connective tissue

¹ Rogeau, *Bull. de la Soc. Anat.*, t. xlix, p. 108.

papillæ, into the common cavity. These processes sometimes persist and enlarge, so that the inner layer of the cyst is here and there studded with minute, soft, vascular excrescences, which impart to it a villous appearance, discernible by the naked eye. They do not, however, arise from the periacinous stroma, whereby they are distinguished from the large intracystic growths of the connective tissue neoplasms. With their further enlargement the walls of the cyst become thickened through hyperplasia of the adventitia of the membrana propria, and their epithelial lining assumes the characters of the pavement variety.

In the breasts which I have examined the original changes were, for the most part, confined to the acini, but in sections from the same specimens the ducts were also seen to participate in the process. In some cuts the transformed acini communicated with dilated tubules; while in others, and in the majority, the acinous alterations appeared to have been induced by obliteration of the ducts in their immediate vicinity. Hence, I refer the formation of involution cysts primarily to the acini, although not to the entire exclusion of the ducts.

The cysts which occur after the menopause, or at the average age of fifty-four years, are usually seated at the posterior surface and the periphery of the breast, vary in size from a pea to a cherry, and contain greenish fluid. In the majority of instances they are discovered only after the removal of the organ under the supposition that the disease was carcinoma.

In eight instances in which the affection had attained sufficient dimensions to demand surgical interference, the cyst was single in five and multiple in

three. In the former the sac varies from the volume of a hen's egg to that of a double fist, and its contents are always discolored. Its rate of growth is variable. It sometimes increases comparatively quickly, as did one recorded by Richelot,¹ which in less than three years acquired a bulk greater than that of two fists. On the other hand, it requires many years to attain the size of an egg, so that an average rate of growth cannot be assigned to it. When the cysts are multiple, it is usually found that one has rather large dimensions, and that it is surrounded by others which were not sufficiently developed to be detected. In a case reported by Lawson,² the disease, which was of two years' duration, and had begun at the age of fifty-eight years, presented itself as two large sacs which had replaced the entire gland, and rendered it so bulky and heavy as to require support in a sling.

The diagnosis of multiple cysts is not easy, since the age of the patient, the hard, irregular, and knotted feel of the breast, and, it may be, the presence of an enlarged gland in the axilla, as in an example witnessed by Paget,³ suggest the idea of carcinoma. When, on the other hand, the cyst is single or double, and of considerable volume, its nodulated or slightly lobulated outline, the thinned state and violaceous or dusky-red tint of the skin, the fluctuation, and probably a discharge from the nipple, are signs that cannot be mistaken. In either event, the prognosis is favorable, as it is in all the cystic formations of the mamma.

¹ *Des Tumeurs Kystiques de la Mamelle*, Paris, 1878, p. 113.

² *Trans. Path. Soc. London*, vol. xxi, p. 354.

³ *Op. cit.*, p. 408.

β. Evolution cysts, or those which form during the period of the functional activity of the breast, are usually due to dilatation of the lacteal sinuses and larger ducts, since only about one-fourth originate in the same way as do the cysts of the senile gland. Of 22 examples that I have analyzed, four of which came under my personal observation, the tumor was single in 17 and multiple in 5. The walls, as a rule, are thin and vascular, while in rare cases they are calcified.¹ The contents, originally of a lactescent nature, vary greatly in their appearances. In 5 per cent. of all cases they are greasy and oleaginous; in 25 per cent. they are serous; in 25 per cent. they are of a reddish hue or sero-sanguinolent; while in the remainder they are of a green, brown, greenish-brown, black, dark-red, or yellow tint from altered hæmatin, and frequently contain plates of cholesterine. Although, when solitary, they are usually of the size of a walnut, they may constitute globular or ovoid tumors as large as a goose's egg, a fist, or, as in the case of Marini,² may contain nine pounds of fluid. When multiple, hundreds may be scattered throughout the gland, their volume varying from that of a hemp-seed to that of a pigeon's egg. In this event, their walls are liable to be thick.

Single cysts are most common in the central area of the breast, and are decidedly frequent near the areola, from implication of the lacteal sinuses. They may, however, originate in the accessory glands which lie in the connective tissue immediately beneath the areola, and which Dr. Sinety³ has demonstrated to

¹ Velpeau, *Diseases of the Breast*, Sydenham Soc. ed., p. 272.

² *Gazette des Hôpitaux*, 1838, p. 282. ³ *Bull. de la Soc. Anat.*, t. lii, p. 460.

exist, to the average number of four, in every fourteen out of fifteen women. A case described by Velpeau,¹ in which a young girl could express a reddish fluid through a small opening two lines below the nipple, doubtless comes under this category. Multiple cysts, on the other hand, usually develop at the posterior surface of the mamma and at its periphery.

The disease is most frequent in comparatively young married and prolific women. Thus, of the 22 cases, the age of 11 was from thirty to forty years, of 5 from twenty-one to twenty-eight, of 1 fifteen, and of 5 from forty-two to forty-five, or of the thirty-fourth year on an average; while 17 were married and 5 were single. Five examples were directly attributable to injury; but the exciting cause was inappreciable in the remainder.

The outline of evolution cysts is usually smooth, nodulation or bosselation being rare even when the sac is large. Their volume, as a rule, hardly exceeds that of a walnut, that of a filbert or a pigeon's egg being attained in a year, although in one of my cases the size of an orange was reached in that time. Billroth² records one as large as a goose's egg in five years; and Richelot³ one of the bulk of the fist in fifteen years; while in the case of Marini⁴ the cyst contained nine pints of a serous fluid in the short space of three months. On the whole, it may be said of these cysts that their volume is moderate, and that their increase is slow.

The consistence of evolution cysts is usually firm and elastic, fluctuation being distinct only in excep-

¹ *Op. cit.*, p. 251.

² *Chir. Klinik*, Wien, 1869-'70, p. 143.

³ *Op. cit.*, p. 112.

⁴ *Ante.*

tional instances. In one example out of every three and two-thirds there is a discharge from the nipple, but it is spontaneous in only one-half of these. The mamilla itself is deformed in one case out of every seven and one-third, being buried, through the projection of the sac beyond its level, and preventing suckling. There are no adhesions to the skin or to the chest; the subcutaneous veins were prominent in one example of a large inflamed solitary cyst; there is slight pain in one case out of every seven and one-third; and the partially translucent cyst may have a bluish tint in 4.5 per cent. of all instances.

They are not very liable to inflammation or ulceration. In the case of Richelot, the sac suppurated, and ulceration and gangrene of the skin ensued; while in one instance of multiple cysts, recorded by Sir Astley Cooper,¹ several ulcerated, but subsequently healed. In both of these there was an enlarged gland in the axilla, a condition which was not met with in the remaining cases.

The diagnosis of a small cyst is impossible without a resort to the exploring needle, since its firm consistence, mobility, and painless and chronic course render it very liable to be confounded with a small solid neoplasm. A growth which presents these features, and which is seated near the nipple of a married woman between twenty-five and forty years of age, and which is preceded by, or attended with, a discharge from the nipple, may reasonably be suspected to be an evolution cyst, while distinct fluctuation and a bluish tint go far to clear up the true nature of the case. When multiple the breast may

¹ *Op. cit.*, Case VI of hydatid tumors.

present a bossed appearance, but the characters of the individual bosses or tubers are merely those of a single cyst.

B. Lacteal Cysts.—Galactoceles, or cysts containing either pure or altered milk, are even more rare than simple cysts, and are due almost exclusively to dilatation of the sinuses and larger ducts, the majority being found in the immediate vicinity of the nipple and areola. In accordance with their consistence they are divided into liquid and solid galactoceles, the former predominating. Of seventeen cases which I have collated, inclusive of two under my own care, the contents were pure milk in seven; of the nature of cream in two; oil in one; of a partly curdy material and partly fluid character in one; of a semisolid, dry, grayish-white curd or caseous matter, which is composed of broken-down epithelial cells, globules of oil, and acicular crystals of palmitine and stearine, or a mixture formerly called margarine, in five; and of the nature of butter, whence the term butyroid cyst, in one. These variations in the character of the contents are dependent upon the chemical and mechanical changes which the milk undergoes, the inspissation becoming more marked as that fluid parts with its watery constituent, and as the albuminous elements predominate. Calcification of the caseous mass, which has been observed in animals, and which is said by some authors to occur in the female breast, appears to be rather a tradition than a fact founded upon actual observation.

Lacteal cysts are almost invariably solitary, the only exception to the rule of which I have any knowl-

edge being a case recorded by Forget.¹ In this case, in addition to the principal sac, which was of the volume of a double fist, there were two others of the size respectively of a pigeon's egg and a hazel-nut. These cysts are not liable to inflammation, although in the instance just mentioned the wall of the largest was the seat of two ulcers, the bases of which were formed by the softened and slightly suppurating mammary tissue. Sir Astley Cooper² states that ulceration, with escape of its contents, sometimes follows excessive distention of the sac; but the cases which I have examined do not confirm this assertion.

Galactoceles are generally observed during lactation. Thus, of fifteen examples in which the date of appearance is noted, twelve occurred at a period which varied from ten days to seven months after parturition, and usually within three months; one³ developed sixteen months before childbirth, and increased most rapidly after weaning; one appeared during pregnancy; while, in a remarkable instance recorded by Bouchacourt,⁴ an enormous cyst, filled with pure milk, formed in a woman fifty-one years of age twenty-four years after her last accouchement. In two examples the disease was attributed to a blow, and in at least one there was antecedent mastitis.

The outline of a milk cyst is globular or ovoid, and not infrequently somewhat nodulated, while its volume and rate of increase depend upon the nature of its contents. Thus, when the contents are fluid it may appear rapidly and acquire the capacity of two, six,

¹ *Bull. Gén. de Therapeut.*, t. xxvii, p. 359.

² *Diseases of the Breast*, Phila., 1845, p. 19.

³ W. F. Atlee, *Amer. Jour. Med. Sciences*, April, 1874, p. 419.

⁴ Richelot, *op. cit.*, p. 18.

and even ten pints in a short time, as in the celebrated case of Scarpa.¹ In this case the breast began to enlarge ten days after parturition, and in less than two months measured thirty-four inches in circumference and rested upon the thigh when the patient was seated. On the other hand, when the accumulation is slow, the increase is so gradual that the sac may contain only ten ounces in thirteen years, as in an example recorded by Birkett.² When the contents are converted into a cheesy mass, the size and growth vary from the dimensions of a pigeon's egg in seven months to those of a child's fist in three years.

During its entire course a galactocoele is unattended with pain or tenderness; the skin is not discolored; the nipple is natural, except in rare cases in which the swelling protrudes beyond its level, and interferes with suckling; the axillary glands are not enlarged; there are no adhesions; and the general health does not suffer.

A large, solitary, pendulous, painless, soft, and fluctuating tumor, with prominence of the subcutaneous veins, which formed suddenly during lactation, may safely be pronounced to be a cyst containing milk; and the diagnosis is confirmed if, as occasionally happens, a few drops of that fluid can be made to escape from the nipple. When of moderate volume, a liquid galactocoele will usually be found to increase in size at each successive parturition, to become tense during suckling, and to decrease with the cessation of lactation. Despite these changes in volume, it, however, continues to grow slowly, and is the seat of fluctuation.

¹ Boyer, *Maladies Chirurgicales*, 1st ed., t. vii, p. 217, and Forget, *loc. cit.*, p. 356.

² Holmes's *System of Surgery*, 2d ed., vol. v, p. 264.

When, on the other hand, the contents are of a semisolid or cheesy nature, the distinction between a lacteal cyst and a small fibroma is scarcely apparent. Thus, in a lady twenty-four years of age, whom I recently saw, there was a round, slightly nodulated, firm, and painless tumor just internal to and above the areola, which rolled under the finger, was of the volume of a hickory-nut, and was of sixteen months' duration. As it developed two weeks after parturition, I inclined to the opinion that it was a solid galactoceles; but I was not certain as to its true nature until an exploratory incision gave vent to its curdy contents. In such cases the swelling is observed, soon after its commencement, to fluctuate; but it gradually becomes solid, and frequently diminishes in size, and may even retain the impression of the finger.

Upon the whole, in the absence of exploratory puncture, the development of a swelling, without signs of inflammation, during lactation, affords presumptive evidence of a milk cyst.

2. HYDATID CYSTS.

When the embryo of the *tænia echinococcus* finds its way into the stroma of the mamma, it is transformed into a vesicular worm, and is soon encapsuled by a fibrous membrane of new formation, in which it grows and multiplies until it occasions a tumor which may attain the volume of a fist. It is the most uncommon of all the cysts of the breast, as is shown by the fact that, up to 1874, Haussmann¹ of Berlin had been able to collect only sixteen examples, to which

¹ *Die Parasiten der Brustdrüse*, Berlin, 1874.

may be added two cases recorded, respectively, by Lauenstein¹ of Gottingen, and Landau² of Breslau. In the latter the sac communicated, by an opening three centimetres square through the ribs and intercostal muscles, either with the cavity of the chest or the abdomen; but it was impossible to determine whether it was connected with the pleura, the diaphragm, or the liver. In none of the remaining seventeen cases did the parasites reach their destination by ulceration through the wall of the chest, but they entered it through the usual channel of the circulation.

In the majority of instances there is a single cyst with scolices adhering to its inner wall or germinal membrane, or floating in its clear non-albuminous fluid; while in the others there is a parent cyst containing from one to four, but rarely more, smaller vesicles, the size of the former varying between that of an apple and that of a man's fist. The limiting capsule is composed of vascular connective tissue, and may reach the thickness of two-fifths of an inch.

Hydatid cysts occur as early as the twenty-second and as late as the fifty-sixth year. Of 11 cases in which the age is noted, 6 first appeared between 20 and 30 years; 2 between 30 and 40 years; 2 between 40 and 50 years; and 1 after the age of 50. Their growth is extremely slow, although it is very variable. Thus, they may attain the size of a filbert in eleven months, of a small egg in two years, of an orange or a cocoa-nut in five years, of a pigeon's egg in six years, or of an apple in eight years, so that, while an average rate of increase cannot be assigned

¹ *Ueber der Vorkommen von Echinococcus in der Mamma.* Inaug. Dissert., Gottingen, 1874.

² *Archiv für Gynäkologie*, Bd. viii, 1875, p. 350.

to them, the endogenous hydatid may be said to be of slower growth, although it finally acquires a larger volume, than the single cyst. Their increase is materially hastened by trauma, and in one instance appeared to advance during lactation.

From the fourteen cases which are available for writing the life history of these tumors, it appears that they grow slowly, attain moderate size, are painless, of a round and smooth outline, of a firm, or firm and elastic, consistence, mobile under the skin, not attached to the chest, seated at the upper and outer part of the breast and never in the immediate vicinity of the nipple, free from changes in the skin, veins, and lymphatic glands, little liable to inflammation, and do not impair the general health.

Deviations from this general course were indicated by pain in two instances; by slight tenderness on manipulation in five; by a nodulated outline in two; by fluctuation in five; by attachment to the skin in four; by irritative hyperplasia of the axillary glands in two; and by inflammation, with ulceration and the escape of purulent fluid, which had accumulated between the parasite and the enclosing cyst as a result of irritation, in three.

While the prognosis is highly favorable, the diagnosis is most obscure, the discrimination between it and a simple cyst being impossible, but being easy when compared with a lacteal cyst which appears during lactation and is usually prominent in the vicinity of the nipple. In two cases it was thought to be carcinoma; and it is also liable to be confounded with other neoplasms, unless exploratory puncture be resorted to.

CHAPTER XI.

THE DIAGNOSIS OF TUMORS OF THE MAMMARY GLAND.

IN the formation of a correct diagnosis of mammary tumors it is of the last importance that both breasts be fully exposed, and that the patient be placed in the recumbent posture. With regard to the first point little need be said, as a comparison of both glands frequently serves to clear up features which were obscure when the examination was confined to one alone. In many women who have borne children, and the more especially should the breasts be lax, if, as too commonly occurs, the organ be explored when it is partially confined by the corset, and it be seized between the thumb and fingers when the patient is seated, an enlarged or apparently enlarged lobe may be felt, which conveys the impression of a distinct tumor. If, however, the patient be recumbent, and the gland be permitted to rest in its normal position, gentle pressure with the fingers backward toward the chest will show that the supposed neoplasm has disappeared; while, if one really exists, it will not only not elude this mode of manipulation, but be rendered more prominent. The presence of a new growth having been determined, the first desire of the surgeon is to ascertain whether it be of a carcinomatous or of a non-carcinomatous nature. With the view of facilitating this step of the inquiry, the

affinities and contrasts of these two great clinical divisions are arranged in the subjoined tabular form, and are based upon a study of their antecedents, and of the prominent points in their general pathology. The non-carcinomatous neoplasms include fibroma, sarcoma, myxoma, and adenoma.

CARCINOMATOUS TUMORS.¹NON-CARCINOMATOUS TUMORS.²*Age of Development.*

Appear, on an average, at the forty-eighth year. 77·26 per cent. develop after the age of forty, and never before the twentieth year. In impubic girls the idea of cancer may be discarded.

Appear, on an average, at the thirty-third year. 30·37 per cent. develop after the age of forty; 15·15 per cent. before the twentieth year; and 5·18 per cent. before the establishment of menstruation.

Social Condition.

88·22 per cent. of the patients were or had been married, and 11·77 per cent. were single. Of the former, 83·91 per cent. had borne children, and 16·09 per cent. were sterile.

61 per cent. were or had been married when the tumor was first observed, and 38 per cent. were single. Of the former, 86 per cent. had borne children, and 14 per cent. were barren.

Menstrual Function.

61·5 per cent. were menstruating when the growth was first detected.

93 per cent. were menstruating when the tumor was first noticed.

Hereditary Predisposition.

Traceable to heredity in 11·28 per cent. of all cases.

Do not appear to be inherited.

Injury and other Exciting Causes.

The influence of trauma is seen in 11·70 per cent. of all instances. There was an antecedent lump after puerperal mastitis in 8·21 per cent., and eczema of the nipple in 1·03 per cent., of all cases.

Ascribable to injury in 11·94 per cent. of all cases, and to eczema in 1·44 per cent. In 1·44 per cent. there was antecedent mastitis.

¹ The conclusions are drawn from an analysis of 712 cases.

² Based upon a study of 138 cases.

Situation.

Most common at upper and outer margin, and not infrequent near the nipple.

Usually at the upper and inner circumference. Rarely near the nipple.

Outline.

Irregular, slightly tuberos, knotted or knobby, frequently discoid, and merged into the surrounding tissues.

Round, ovoid, rarely discoid, lobed, bossed, or nodular, and distinctly circumscribed.

Consistence.

Uniformly densely hard and inelastic throughout, except in rare instances of combination with an involution cyst, when there is a limited spot of fluctuation. As an exception, may be firm and elastic, or even soft and fluctuating.

All are firm or hard at first, and frequently elastic; but not a few are soft later. Many are of unequal consistence, when they have existed for some time, in which event they are hard at some points, and soft, or even fluctuating, at others.

Multiplicity.

Several tumors are present in the same breast in 2 per cent. of all cases.

Several tumors present in the same breast in 5.97 per cent. of all cases.

Volume and Rate of Growth.

Never reach the dimensions of the simple tumors, and usually smaller than the breast which they have replaced. Grow continuously and comparatively slowly, and are quite liable to shrivelling of the stroma, particularly when they occur late in life.

May attain a huge size. Frequently increase by fits and starts; grow comparatively rapidly; and do not, except in rare cases of fibroma, undergo cicatricial atrophy.

Mobility.

Move with the gland of which they form a part, and cannot be isolated. Attachments to the skin and chest are common and frequently extensive.

Glide and roll under the fingers, and move freely within the mamma and on the adjacent parts; or, if there be attachments, which are exceptional, they are limited.

Relations to Breast.

If the tumor develops within the substance of the mamma, the latter is replaced by it, and its structure is destroyed. When it begins at the periphery, the gland is always finally invaded.

Now and then attached to the breast by a pedicle; but the gland is usually pushed to one side, spread out, or atrophied, and rarely invaded.

State of the Nipple.

The nipple is permanently retracted and fixed in 52 per cent. of all cases, and is often infiltrated.

The mamilla, in 5·22 per cent. of all instances, is displaced, buried, or sunken, by the growth of the tumor beyond its level. Hence it is mobile and not truly retracted, and it is not infiltrated.

Discharge from the Nipple.

A thin sanguinolent discharge is met with in 9 per cent. of all cases, but it is never copious.

A discharge, usually of a mucoid nature, is seen in 8·95 per cent. of all instances; and the escape of a bloody fluid favors the idea of vascular vegetations in dilated ducts.

Superficial Veins.

The subcutaneous veins are somewhat prominent in 2 per cent. of all cases.

The superficial veins are enlarged and prominent in 13·43 per cent. of all examples.

Condition of the Skin.

The skin, even when the tumor is not larger than a hazel-nut, provided it be superficial, is dimpled and adherent. In larger growths, it is adherent, thinned, or discolored, or rigid and brawny from specific infiltration, in 34·54 per cent. of all cases, and the seat of distinct nodules in 10·61 per cent.

The skin is natural when the tumor is of moderate dimensions, but thinned and stretched, or discolored, or adherent, in 31·34 per cent. when the neoplasm is voluminous. It is never dimpled nor the seat of secondary tubers.

Fixation to the Chest.

The tumor is attached to the pectoral muscle or thorax in 21.58 per cent. of all instances.

The tumor adheres to the subjacent structures in 2.98 per cent. of all cases.

Both Breasts affected.

The disease extends to the opposite breast in 3.65 per cent. of all examples, but never before infection of the skin and the lymphatic glands.

The other mamma contains a similar growth in 5.22 per cent. of all cases, but without antecedent skin or gland involvement.

Ulceration.

The formation of an ulcer ensues, comparatively early, in 23.77 per cent. of all cases. The edges of the sore are everted, thick, and indurated, and adherent to the hardened base. It never attains the size met with in the simple tumor, does not fungate, nor does it cicatrize to any great extent.

Ulceration, or limited gangrene, of the stretched and thinned integuments occurs, late in the disease, in 16.41 per cent. of all instances. It is generally attended with the protrusion of a pedunculated fungus, which is not attached to the margins of the ulcer, the edges of which are smooth, even, and not discolored or infiltrated. The base is usually composed of intracanalicular vegetations, and it now and then heals.

Lymphatic Glands.

The axillary glands are enlarged and hard, when the patient first comes under observation, in 64.23 per cent. of all cases; and in 1 out of every 22 instances the glands of the neck are also involved.

Enlargement of the glands of the axilla is met with in 2.98 per cent. of all examples; but it is due almost solely to irritative changes, and they are not hard. The supraclavicular glands are never implicated.

General Condition.

The general health of the patients is, as a rule, wonderfully good when they first come under observation.

The same statement is true of the non-carcinomatous growths.

Local Recurrence.

Reproduction after operation is met with in 80·97 per cent. of all cases.

The tumor recurs after extirpation in 27·05 per cent. of all instances.

Duration of Life.

The average life from the first observation of the disease to the final report after its removal is forty months; but the majority of the patients were dead.

The average life is rather more than seventy-two months; but the majority of the subjects were still living.

In the differential diagnosis of the cancerous and so-called benign neoplasms the deductions based upon the study of their etiology are, as I pointed out in Chapter III, for the most part, without value. Hereditary predisposition, when it can be traced, is an antecedent which favors the idea of carcinoma; but it must not be forgotten that the most innocent formation, as in the case of a retention cyst occurring in a lady forty-three years of age who was recently under my charge, not infrequently occurs in the daughter of a cancerous mother. So, too, the development of a tumor after the age of forty out of an induration left by puerperal mastitis points to cancer, as that condition antedated 8·21 per cent. of the carcinomatous, and only 1·44 per cent. of the non-carcinomatous growths.

Age, as an indication of the anatomical arrangement of the component tissues of the mamma, is, as I showed at page 34, so important an aid in the diagnosis that a neoplasm occurring before the twentieth year may safely be pronounced to belong to the non-carcinomatous group, while the chances in favor of carcinoma are as twelve to one after the age of forty. To be more exact, I have framed the follow-

ing conclusions in regard to the structural development of the mamma, as manifested by the age of the patients, and the development of its neoplasms:

First. During the rudimentary condition of the organ almost the only growth met with is fibroma.

Secondly. When the glandular structure is being evolved, after the appearance of the menses, and the connective tissue is still in excess, fibroma and fibrous sarcoma are the most common growths.

Thirdly. At the epoch of and after the first pregnancy, that is, between twenty and thirty years, when the glandular structure is perfected and the connective tissue is vascular, succulent, and rich in cells, fibromata and small round-celled, or small spindle-celled sarcomata, which are equivalent to medullary sarcomata, are to be anticipated.

Fourthly. From the thirtieth to the fortieth year, or during the stage of passive maturity, cystic sarcomata and cystic fibromata are most frequently met with, and true adenoma is also most common.

Lastly. During the period of involution, when the lacteal glands are disappearing, and the connective and adipose tissues are becoming abundant, myxoma and carcinoma make their appearance.

Of the symptoms themselves, valuable information is to be derived from the consistence, dimensions, isolation, and mobility of the growth, as well as from the condition of the skin, the nipple, the subcutaneous veins, and the associated glands. As the majority of these signs were sufficiently dwelt upon in the chapters on the individual neoplasms and in the preceding table, I will only direct attention to those which are the most important.

In the non-carcinomatous tumors the skin, while it may be thinned, stretched, and discolored, or somewhat adherent, is rarely invaded by cell infiltration, and is never the seat of distinct nodules or tubers. In carcinoma, on the other hand, its infiltration by advancing epithelial cells gives rise to a hard, brawny condition, which is very characteristic, or to extensive adhesion, or discoloration, or to distinct tubers; and it is not infrequently pervaded by beaded or varicose lymphatics, which, as far as I know, are never seen in the opposite class of tumors.

While ulceration is less frequent in the non-carcinomatous than in the carcinomatous growths, it also arises in a very different way, and has certain peculiarities which are distinctive. Thus, it is the almost invariable result of limited gangrene of the thinned and stretched, but not infiltrated, skin; while its edges are smooth, soft, and sometimes elevated upon the fungus which protrudes through, without being attached to it. Such an appearance is peculiar to the non-carcinomatous growths, and is of itself quite sufficient to exclude the idea of carcinoma.

The nipple is permanently retracted in more than one-half of the cases of carcinoma, while it is sunken, by the protrusion of the tumor beyond its level, in only one out of every twenty of the non-carcinomatous neoplasms. This contrast is most striking; but it is not more so than one might expect, if the contracting nature of carcinoma is borne in mind. When, in addition to the retraction, the mammilla is also fixed and indurated, these conditions may almost be regarded as pathognomonic of carcinoma. Discharge from the nipple merely indicates that the

glandular structure is involved, either primarily or secondarily, and that one or more of the ducts leading from the secreting lobules are permeable. When it antedates the detection of a tumor, there is every probability that the growth is an adenoma. If the neoplasm has a solid and hard feel, it is probably a carcinoma, since a discharge is only met with in the cystic non-carcinomatous tumors.

Fixation, or adhesion, to the walls of the chest is a valuable symptom of carcinoma, inasmuch as it is ten times more frequent, and far more extensive, than in the opposite class of growths.

Of all the signs, there is none which is so valuable in the differentiation as the state of those lymphatic glands which are in anatomical connection with the breast. Thus, in every one hundred cases of carcinoma, when the patient first comes under observation the axillary glands will be found to be enlarged and indurated in sixty-four, and in nearly one-third of these the glands above the clavicle will also be contaminated. Of the non-carcinomatous tumors, on the other hand, out of every one hundred cases, in only three are the axillary glands enlarged, while they are never densely hard. The glands above the clavicle are never implicated.

The diagnosis of the non-carcinomatous neoplasms is based, therefore, upon their occurrence in one case out of every six and two-thirds before the age of twenty; their greatest frequency before the fortieth year; their multiplicity in one breast; their circumscribed, rounded, or ovoid and bossed outline; the firm consistence of the smaller and the unequal feel of the larger; their mobility in or on the breast and

the adjacent tissues ; their comparatively rapid growth and large volume ; the almost normal appearance of the skin ; the enlargement of the superficial veins when they are bulky ; their tendency to ulcerate and fungate late in the disease ; the absence of adhesions between the protrusion and the circular, and as it were punched-out, margins of the ulcer ; and, finally, their exemption from a history of hereditary predisposition, from retraction of the nipple, and from enlargement of the associated lymphatic glands.

The points in favor of carcinoma are a history of heredity ; non-development before the twentieth year ; greatest frequency after the fortieth year ; irregular, knobby outline ; uniformly densely hard consistence ; immobility in the breast ; relatively small volume and slow growth ; retraction of the nipple ; enlargement and induration of the lymphatic glands ; invasion of the skin ; fixation to the pectoral muscle or walls of the chest ; limited ulceration, late in the disease, without any tendency to fungous protrusion ; and the thickened, indurated, and everted edges of the ulcer.

The gross anatomical characters of these two classes of neoplasms are sufficiently characteristic for diagnostic purposes. The carcinomatous are not surrounded by a limiting capsule, so that their attachments are so close that they are with difficulty freed from the adjacent skin, fat, fasciæ, and muscles. On section, they are firm, crisp, tough, and often creak under the knife. Their cut surfaces assume a concave appearance, are not lobed or cystic, and cannot be torn into small bundles ; and their grayish basis is traversed by minute points of fat or by yellow

lines, which represent the remains of ducts with their contents in a state of fatty degeneration. They are also frequently pervaded by glistening white fibrous bands, so as to look like the section of an unripe pear; and a pultaceous, milky fluid exudes from them on pressure or scraping.

The non-carcinomatous neoplasms are surrounded by a fibrous capsule, through which they can readily be detached from the surrounding tissues. Although they may be tough, they rarely creak on section, and their divided surfaces are plane, or they may even be prominent, but are never concave. Many, and particularly the sarcomata, have a fibrous tear, which is very characteristic, and not a few are lobed. They are not streaked by yellowish lines, nor do they contain pellets of fat. They are, moreover, frequently the seat of dilated ducts and vegetations, and exude a serous fluid on pressure. An open-mouthed duct, or a small cyst or two, may be found in carcinoma, but these are, with very rare exceptions, free from vegetations. On the whole, the presence of a limiting capsule and of enlarged ducts and vegetations, and the absence of fat and concavity on section, are quite sufficient to distinguish the non-carcinomatous from the carcinomatous tumors.

Having convinced himself of the non-carcinomatous nature of the neoplasm, the surgeon has still before him the solution of the problem as to whether it is solid or cystic. Although the latter merely represents a further stage of evolution of the former, there are some important points of difference between them which render their differentiation comparatively easy.

NON-CARCINOMATOUS NEOPLASMS.

SOLID FORM.

CYSTIC FORM.

Age of Occurrence.

Develops, on an average, at the thirty-first year. 8 per cent. appear before the age of sixteen; 56 per cent. originate during the period of the perfection of the mamma; and 86 per cent. are observed during its functional decline.

Appears, on an average, at the thirty-fifth year. 1.75 per cent. occur before the sixteenth year; 38 per cent. develop between sixteen and forty years; and 60 per cent. are witnessed after the age of forty.

Consistence.

Equable, whether it be firm or soft.

Variable or unequal, being firm at some points, and soft or fluctuating at others.

Volume and Rate of Growth.

Increases slowly, and rarely attains a considerable bulk.

Grows quite rapidly, and sometimes acquires enormous dimensions.

Condition of the Skin.

The skin is discolored in 9.83 per cent., and adherent in 8.19 per cent., of all instances.

The skin is discolored in 26.02 per cent., and adherent in 16.43 per cent., of all cases.

Superficial Veins.

The subcutaneous veins are enlarged in 4.91 per cent. of all cases.

The superficial veins are enlarged in 17.80 per cent. of all cases.

State of the Nipple.

The nipple is buried or sunken in 1.63 per cent. of all examples.

The mamilla is depressed or sunken in 8.21 per cent. of all instances.

Discharge from the Nipple.

Discharge from the nipple is unknown.

The nipple discharges in 16.43 per cent. of all cases.

Fixation to the Chest.

The tumor is always mobile on the chest.

The growth is attached to the pectoral muscle or ribs in 4·10 per cent. of all instances.

Ulceration.

Spontaneous ulceration occurs in 16·55 per cent. of all cases.

Spontaneous ulceration is met with, and generally with fungous protrusion, in 24·63 per cent. of all cases.

Lymphatic Glands.

The glands of the axilla are enlarged in 1·63 per cent. of all examples.

The axillary glands are enlarged in 4·10 per cent. of all cases.

From the foregoing analysis it will be seen that the solid tumors present themselves simply as circumscribed growths, which have an equable consistence, grow slowly, are of moderate volume, and are not characterized by alterations in the associated or contiguous structures. The cystic neoplasms, on the other hand, have a variable consistence, grow rapidly, and attain a large volume, and are quite liable to changes in the skin, prominence of the subcutaneous veins, limited superficial adhesions, spontaneous ulceration and fungous protrusion, and a discharge from the nipple. When the mammilla is deformed, when the tumor is partially fixed to the chest, and when the lymphatic glands are swollen, all of these signs are far more frequent in the cystic than in the solid form. The preceding phenomena, however, do not occur with equal frequency in the different solid and cystic growths, as is set forth in the following statement, which affords important clues to their differential diagnosis.

	SOLID.				CYSTIC.			
	Fibroma.	Sarcoma.	Myxoma.	Adenoma.	Fibroma.	Sarcoma.	Myxoma.	Adenoma.
Average age of development	28 yrs.	37 yrs.	45 yrs.	16 yrs.	36 yrs.	33 yrs.	43 yrs.	35 yrs.
The skin is discolored in...	None.	16 p. c.	40 p. c.	None.	10 p. c.	34.28 p. c.	33.33 p. c.	26.66 p. c.
The veins are enlarged in...	"	8 "	20 "	"	15 "	25.71 "	None.	6.67 "
The nipple is deformed in...	"	None.	20 "	"	10 "	5.71 "	"	13.33 "
Discharge from the nipple in...	"	"	None.	"	15 "	14.28 "	"	26.66 "
Superficial adhesions in...	"	12 p. c.	20 p. c.	"	10 "	8.57 "	33.33 p. c.	40 "
Deep adhesions in.....	"	None.	None.	"	10 "	2.85 "	None.	None.
Ulceration in...	"	12 p. c.	20 p. c.	"	10 "	31.42 "	33.33 p. c.	26.66 p. c.
Axillary glands enlarged in...	"	None.	20 "	"	None.	2.85 "	None.	13.33 "

In the discrimination between the solid and cystic growths, invaluable aid may be derived from the exploring needle or a slight puncture. In the event of the tumor being solid, nothing, save perhaps a little blood, comes away; whereas, if it be cystic, the discharge of its watery or sanguinolent contents will tend to diminish its volume very materially, and it may even be possible to feel the solid vegetations which have been obscured by the presence of the fluid. From simple cysts of the mamma the diagnosis rests upon the fact that the cystic neoplasms do not entirely disappear after the evacuation of the cavities; while from chronic abscess, which not infrequently simulates a cystic growth, the distinction is based upon a drop of pus following the withdrawal of the exploring needle.

The differential diagnosis of the varieties of carcinoma may be determined by attention to their contrasts and affinities, which are set forth in the table at page 182.

Although the lines of demarcation between many of the tumors of the mamma are not very distinct,

yet a careful attention to their more prominent signs enables one to arrive at a pretty correct judgment as to their true nature. From an analysis of the cases that have occurred in my own practice, and of those collated from various sources, I have framed the following conclusions:—

1. A uniformly hard, perfectly movable, nodular, slowly growing tumor, particularly if it be seated at the upper and outer part of the gland of impubic subjects and of married women toward the twenty-third year, and be free from ulceration, alterations in the skin, veins, nipple, and lymphatic glands, is a solid fibroma, and the diagnosis is strengthened by the presence of several growths in one or both breasts.

2. A hard, lobulated, peripheral tumor, or one which, after having remained stationary or progressed slowly for several years, suddenly and rapidly acquires a large volume, and assumes an unequal consistence, being firm at some points and soft or fluctuating at others, and which occurs toward the thirty-sixth year, unaccompanied by lymphatic involvement, but attended, possibly, with discoloration of the skin, deformity of the nipple, and limited superficial adhesions, and it may be with dilatation of the veins, with discharge from the nipple, and with ulceration and fungous protrusion, is a cystic fibroma.

3. A firm, rapidly growing, peripheral tumor, appearing in prolific married females at about the thirty-seventh year, with possibly discoloration and adhesion of the skin, and ulceration, but without deformity of, or discharge from, the nipple, or enlargement of the glands, is a solid sarcoma. A tumor

possessing these attributes, and occurring toward the thirty-second year is probably a firm spindle-celled sarcoma, while one developing at about the forty-second year is more apt to be a firm round-celled sarcoma.

4. A lobulated tumor, particularly if it involves the greater part of the mamma, of quick growth from the commencement, or progressing rapidly after having increased comparatively slowly for some time, of large size, of varying or unequal consistence, occurring toward the thirty-third year, in prolific married subjects, and attended with discoloration of the skin, ulceration, enlargement of the veins, and possibly with discharge from the nipple and with limited adhesions, or, it may be, with deformity of the nipple and glandular enlargement, is a cystic sarcoma. A very rapidly progressing tumor, of soft, apparently fluctuating consistence, with stretched skin and enlarged veins, appearing in young girls before puberty and in young married women, is a medullary sarcoma, which may be solid or cystic, and which is, as a rule, composed of small spindle cells.

5. A solitary, rapidly and continuously growing, although not very bulky, rather firm, or possibly soft tumor, occurring at about the forty-fifth year, with limited discoloration of the skin, but not fixed to the chest, and attended possibly with deformity of the nipple, superficial adhesions, ulceration, dilatation of the veins, and enlargement of the axillary glands, is a solid myxoma.

6. Cystic myxoma possesses the same consistence and growing attributes of the former variety, but it develops at about the forty-eighth year, and is liable

to be attended with discoloration, adhesion, and ulceration of the skin. The veins, nipple, and glands, however, are normal.

7. A hard, heavy, nodular, solitary, very slowly and equably increasing tumor, especially if it develops in the immediate vicinity of the nipple of a married woman toward the thirty-fifth year, and is accompanied by adhesion and discoloration of the skin, and by ulceration, and possibly by deformity of the nipple and enlargement of the glands, but is free from fixation to the chest and dilatation of the veins, and is preceded by a discharge from the nipple, is a cystic adenoma. A solid adenoma cannot be distinguished from a solid fibroma.

8. A densely hard, inelastic, irregular, solitary, slowly growing tumor, occurring in prolific married females toward the forty-eighth year, inseparably connected with the mamma, accompanied by induration and enlargement of the associated lymphatic glands, retraction of the nipple, infiltration of, and possibly nodules in, the skin, ulceration, and fixation to the chest, and it may be by a discharge from the nipple, is a scirrhus carcinoma; and the diagnosis is strengthened, if there be a history of heredity, should the tumor be preceded by psoriasis or eczema of the nipple, or should it be developed from an induration left by puerperal mastitis.

9. A soft, lobulated, voluminous, solitary, and rapidly increasing tumor, occurring in the same class of women, at about the fiftieth year, and attended with infection of the glands and skin, retraction of the nipple, fixation to the chest, and possibly extension to the opposite breast, but without discharge

from the nipple, or without marked tendency to prominence of the veins or ulceration, is a medullary or encephaloid carcinoma.

10. A hard, very slowly growing, small, solitary tumor, occurring toward the forty-fifth year, with adhesion to the skin, and it may be nodules in that structure, prominence of the veins, retraction of the nipple, and enlargement of the glands, and possibly with invasion of the opposite breast, fixation to the chest, ulceration, and discharge from the nipple, is a colloid carcinoma.

11. A densely hard, irregular and knotty, contracting and small, solitary tumor, occurring at about the forty-seventh year, and attended with retraction of the nipple, infection of the glands and skin, and possibly distinct tubers in the skin, ulceration, and immobility on the chest, is an atrophying scirrhus.

12. A slowly increasing, solitary, nodular, or slightly lobulated tumor, occurring after the menopause, covered by thinned and discolored skin, fluctuating, and probably discharging by the nipple, but without enlargement of the veins or glands, and without fixation to the chest, is an involution cyst.

13. A solitary, smooth, firm and elastic, or possibly fluctuating tumor, occurring in the vicinity of the nipple of young and prolific married women, of moderate volume, of slow growth, and unattended with alterations in the veins, nipple, skin, or glands, or with adhesions, but liable to ulceration and enlargement of the glands if it inflames, is an evolution cyst.

14. A solitary, slowly growing, not bulky, fluctuating, or semisolid tumor occurring near the nipple

of lactating women, and unattended with changes in the coverings of the mamma or in the glands, is a lacteal cyst.

15. A slowly growing, small, smooth, round, firm and elastic, or fluctuating, solitary tumor, occurring between the ages of twenty and thirty years, seated at the upper and outer border of the breast, and not near the mammilla, with a disposition to ulcerate, but without other changes in the skin, veins, or glands, is an hydatid cyst.

CHAPTER XII.

THE TREATMENT OF TUMORS OF THE MAMMARY GLAND.

THE management of mammary neoplasms should be based solely upon the conclusions drawn from the prominent facts in their life, which we have now learned in studying their general pathology. Those in regard to which there is the most hesitation in practising an operation are the small, circumscribed, mobile growths which are so frequently met with toward the periphery of the gland, and which may remain stationary for a number of years. Among the older records there are statements to the effect that they may disappear after marriage, or during pregnancy, or even at the period of the menopause; but this occurrence is so exceptional that the resources of nature alone cannot be relied upon. My own experience in this direction is limited, and of a negative character. I have now under observation two young married women who are affected with firm, elastic, bossed, irregular nodules, which are perfectly mobile upon and under the contiguous structures, but are closely attached to the gland, and which doubtless represent fibromata, or possibly adenomata. In one of the patients there are two peripheral tubers in the right and one in the left breast. Twenty months ago she gave birth to and nourished a child, but there

has been no appreciable change in the volume of the growths. In the second case, a hard, lobulated nodule of the size of a hickory-nut is seated above and to the inside of the nipple. She also had been led to believe that it would probably disappear after marriage, but now, fourteen months after parturition, it retains its former dimensions.

Should the surgeon or the subject be averse to an operation, methodical compression with pads of agaric or an air-cushion holds out some hopes of success. Thus Broca¹ regards compression as a very efficacious measure; and, although he records nine cases in which the growth disappeared, the majority subjected to this tedious and annoying remedy were only partial cures, a small nodule remaining behind after the cessation of the treatment. Erichsen,² too, speaks well of it; but, with these exceptions, it does not appear to have met with favor.

On several occasions I employed the gum ammoniac and mercurial plaster, with the result of causing the absorption of the pericapsular fat, but without any effect upon the tumor itself. The inunction of stimulating and sorbefacient ointments is not only useless, but it is liable to prove irritating, and awaken the growth into activity.

Since little can be expected from local measures, are these small neoplasms to be let alone from the mere fact that they are quiescent? While it may be true that no harm will result from such advice, it is more likely to be true that harm will ensue; and I doubt not that many surgeons can recall to mind cases of large, ulcerated, fungous, offensive masses

¹ *Op. cit.*, vol. ii, p. 462.

² *Op. cit.*, vol. ii, pp. 564 and 578.

which could have been prevented by an early operation. In the Second Chapter I direct attention to the fact that, although they may remain of apparently little importance for many years, they exhibit a tendency to change their nature, so that a pure fibroma may be the starting-point of a sarcoma, an adenoid fibroma and an adenoma may pass into a carcinoma, and a lipoma may be converted into a myxoma. For these practical truths we are indebted to modern histological researches, and the lesson which they convey is one that should not pass unheeded. All of the encapsuled or non-carcinomatous mammary tumors in the early stages of their development possess so many features in common that their differentiation is a matter of such difficulty that it is by no means possible to say categorically which is a fibroma, which a sarcoma, which a myxoma, and which an adenoma, so that, if an error in judgment be committed, it had best be on the safe side, and all small tumors of the mamma without exception should be enucleated, an operation that can be performed without materially interfering with the body of the mamma itself, and can be so conducted as to spare the nipple.

As fibrous tumors are absolutely innocent, if their true nature be determined, they may be let alone; but my advice is that they be extirpated if they begin to grow. In point of fact, the conservative surgeon should remember that a progressively increasing tumor is to be extirpated, and that no time is to be lost in deciding upon its intimate nature. My own experience¹ has convinced me that a tumor, not a carci-

¹ *Phila. Med. Times*, vol. viii, p. 82.

noma, which attains the volume of a walnut in six or seven months is a fibrous sarcoma, and that it should be subjected to the knife. As small growths of this description, occurring in young subjects, exhibit little tendency to recur, there is no necessity for sacrificing the entire breast.

If, for any reason whatever, a small circumscribed neoplasm be not interfered with, the surgeon need not be surprised if it finally becomes cystic, attains large dimensions, is a source of annoyance through its bulk and weight, is harassing from the suffering with which it is attended, and ulcerates and wears away life through spoliative discharges and the inhalation of foul odors. Under these circumstances he may have to deal with a cystic fibroma, sarcoma, myxoma, or adenoma, and upon his diagnosis will depend the extent of the operation to which the patient must be subjected. If he is in doubt as to the true nature of the neoplasm, he may be aided by the employment of the freezing microtome, since with this contrivance sections can be made and submitted to minute examination before he has finished taking up the bleeding vessels. On this account the instrument is invaluable, and should be found at least in the operating room of every hospital. Whatever may be the nature of the growth, the entire breast should be removed with it. Should it turn out to be a fibroma, the prognosis is so favorable that nothing more need be done; but, if the tumor proves to be a myxoma or sarcoma, the surgeon should remember that either is excessively liable to return in consequence of the invasion of the adjacent tissues along the line of the bloodvessels, even though there are no visible areas of infection. Hence it be-

comes his duty to search for any outlying lobules of the gland that may have escaped the knife; to dissect off the fascia of the pectoral muscle; and to clear out the axilla entirely in the event of that space containing any enlarged glands. In myxoma the adhesion of the skin is due to its infiltration by tumor elements, so that if that structure be attached it should be removed with no sparing hand. If the underlying pectoral or intercostal muscles are invaded, the diseased structures should be removed for at least an inch beyond the apparent limits of the nodules; in a word, the operation should be thorough in every respect. If under the microscope the growth should prove to be a true adenoma, the removal of the entire mamma will suffice, along with any enlarged lymphatic glands that may be found in the axilla. Another good rule is to sacrifice the breast when it is the seat of multiple tumors, as in this way recurrence may be avoided. As a prevention against local reproduction, in the case of sarcoma and myxoma, the entire denuded surface should be mopped with a strong solution of chloride of zinc, or even seared with the cautery at red heat.

After recovery the patient should be cautioned to see her attendant from time to time, in order that recurrent growths may be extirpated as rapidly as they appear and before they have acquired any considerable size. In a case of a small spindle-celled sarcoma Gross succeeded, after removing fifty-two tumors, by twenty-three distinct operations, the last few of which included portions of the pectoral and intercostal muscles, in a period of four years and a half, in checking the reproductions, and the patient was perfectly well nearly eleven years subsequently. Gay had added

nine years to his patient's life at the date of the last report; and Heath and Haward, in similar cases, removed numerous recurrent tumors in thirteen years. These illustrations demonstrate what may be accomplished by exercising great vigilance, and by cutting with a bold hand; and I have no doubt that the medullary sarcomata of young persons, which attain a large bulk in a few months, and are the most fatal of all tumors of the breast, would yield to treatment if the entire organ, including its investments, were amputated bodily, the pectoral fascia dissected off, and the exposed muscles thoroughly seared with the hot iron. These cases are desperate, and do not admit of mild measures; and the end in view certainly justifies what at first sight appears to be a harsh practice.

Although carcinoma may progress slowly, it none the less destroys life eventually if it be allowed to pursue its course uninfluenced by operation, the average duration of life from the first observation of the disease until the fatal termination being only twenty-seven months. Even when subjected to the knife the reproductions in or near the cicatrix, in the lymphatic glands, or in the viscera, were formerly so invariable as to lead some surgeons to refrain from operating under any circumstances. Others, influenced mainly by the statistics of Paget, Sibley, and Baker, advise interference with the view to avert mental anxiety and physical suffering, and to prolong life; but they do not entertain the most remote idea of effecting a radical cure. These opposed and erroneous practices are obviously the result of deductions based upon operations inadequate for the entire removal of the disease, since the common procedure

is to circumscribe the nipple and a portion of the skin by two incisions, to dissect the gland out of its bed of fat down to the pectoral fascia, to remove any enlarged glands which were perceptible to the touch previous to the operation by extending the wound upward into the axilla, and to bring the lips of the incisions nicely together. Such operations were deemed to suffice; but they fall far short of thoroughness, as the very structures are left untouched in which the disease spreads and recurs. A carcinoma is not encapsuled, as are the other mammary neoplasms, so that its cells invade the surrounding and adjacent fasciæ, muscles, fat, and skin, which are converted into so many separate centres of new growth and latent zones of infection that are not always appreciable by the naked eye. Hence the infected neighboring tissues and lymphatic glands are the obstacles in the way of permanent relief, and must be completely gotten rid of before the disease can be eradicated.

In a remarkable paper, entitled "The Influence of Inadequate Operations upon the Theory of Cancer,"¹ the late Mr. Moore, of London, in 1867, enunciated certain doctrines which, had they been widely circulated and appreciated at their full value, would possibly ere this have demolished the antiquated and utterly false teachings as to the incurability of carcinoma. In this paper he insists that not only the entire mamma, but that all involved adjoining textures, as the skin, fat, pectoral muscle, and lymphatic glands, must be extirpated; and that, in conducting the operation, the tumor should neither be cut into

¹ *Med.-Chir. Trans.*, vol. 1, p. 245.

nor be seen. These suggestions—and their wisdom has been confirmed by histological researches—appear to have been accepted in Denmark, Germany, and Austria; and the result of their practical adoption has been the demonstration of the fact that tumors pronounced to be carcinomatous by the most competent observers are amenable to treatment. This view is now rapidly gaining adherents among the best minds in all parts of the world; and surgeons are beginning to know that cancer can be cured by thorough operations if it be attacked before it has disseminated itself extensively locally or has tainted the general system.

In favor of this modern doctrine, the life history of the affection shows, first, that it is primarily a local degeneration of the mamma, and that its tendency is to advance toward the surface before it invades the deeper structures, the lymphatic glands, and the viscera; and, secondly, that local infection does not ensue, on an average, before the expiration of thirteen months, the skin being involved in fourteen months, the lymphatic glands in fifteen months, the walls of the chest in twenty-two months, and the viscera in thirty-one months. Hence, if the local trouble can be gotten rid of before it has contaminated the adjacent and distant structures, there is no reason why the remedy should not prove to be as final as it is for the non-carcinomatous neoplasms.

The decision of the curability of cancer is not only based upon the study of its general pathology, but is confirmed by the practical test of the results of operations. In settling this all-important question, it is necessary at the outset to define what is

meant by the term *cure*. As I have pointed out in the chapter on carcinoma, metastatic tumors develop in thirty-one months, and death usually ensues, no matter whether the patients have been operated upon or not, in thirty-three months on an average. Local reproduction after removal is witnessed in less than one case out of every hundred after the expiration of three years; so that, if the patient survives three years after the last operation without recurrence, or dies of some intercurrent malady under the same circumstances, I assume that she has recovered. Although, of course, each case will have to be dealt with in accordance with its individual merits, the question must be decided by facts based upon the general life of the disease. Of 485 cases of ordinary scirrhous, medullary, colloid, and atrophying carcinoma, in which the history is complete, 51, or 10·51 per cent.—and 47 were still living—fulfilled these requirements, the average life after operation having been four years and ten months. Of the cases in which the affection pursued a natural course only 1·5 per cent. survived six years; while of those subjected to the knife 30 per cent. were living free from disease after the expiration of six years, and, as may be seen by consulting the table at page 165, four were alive for more than seven years, and the remaining eleven were well for periods which varied between eight and fifteen years. In these cases it is not at all probable that the disease will reappear, so that they must be regarded as positive recoveries rather than as examples of prolongation of life after operation.

To attain this long-sought-for result the rules laid down by Mr. Moore for our guidance should not only

be strictly adhered to, but they should, in my opinion, be still further extended. Thus, in the most favorable of all cases, namely, one in which the tumor is of moderate volume, and devoid of superficial and deep attachments and enlargement of the axillary glands, the proper procedure is to remove the entire breast and its coverings by a circular incision, search for any outlying lobules that may be disseminated throughout the mammary region, dissect off the fascia of the pectoral muscle, and prolong the outer portion of the incision into the axilla with a view to its thorough exploration. Although the glands may have eluded detection previous to surgical interference, careful examination will usually disclose that several are already converted into secondary tumors, and, in this event, the axillary space must be thoroughly cleaned out, with the object of getting rid of so many independent sources of infection of the adjacent tissues and the associated glands. Ample experience shows, first, that the seats of recurrence, or rather further spread of the disease, after operation, are the skin, paramammary fat, remains of the mamma, and glands of the axilla; and, secondly, that recurrence in the axilla is far more frequent after removal of the breast alone than when that cavity was freed of its contents simultaneously with the extirpation of the breast. Even if I should be deemed too bold in recommending that the axilla be attacked, when it is apparently free from disease, surgeons of extended experience will certainly agree with me in regarding the adipose tissue as being largely infiltrated by young cells, for it is just precisely in corpulent subjects that local reproduction is most marked along

the line of the cicatrix of partial operations, or, in other words, in the fat which they have been too anxious to save in order that they might secure thick and seemly flaps.

The case which I have just considered is one in which the skin and pectoral fascia and muscles and glands are apparently free from invasion. Under opposite circumstances interference is by no means contraindicated, provided the evidences of local dissemination are not extensive. Thus, out of 48 of the 51 cures in which the extent of the operation is noted, in 19 the entire breast was amputated and the axilla was cleaned out; and in several of these there were nodules in the skin, and the upper layer of the great pectoral muscle was removed. It is, moreover, comforting to know that the glands may be merely the seat of irritative hyperplasia, since in three cases in which they were permitted to remain the patients were free from recurrence, respectively, for five years and nine months, six years and one month, and ten years and ten months. Glandular involvement is, however, of bad prognostic import, as the chances for permanent recovery are three times greater when the breast alone requires amputation. The same statement is true of extensive infiltration of the pectoral muscles, but these may be cut away with a free hand with some prospect of a successful issue.

When the axillary glands constitute a densely hard and knobby tumor, which is possibly attached to the skin and the side of the chest, and the corresponding arm is swollen, the probability is that the loose connective tissue and fat of that space are infiltrated, as under these circumstances the glandular

growth bears the same relation to the adjacent structures as does the mammary neoplasm to its surroundings. Hence in cases of this description, it is far wiser to attack the axillary tumor before the primary growth is interfered with, since, if the former cannot be entirely removed, in consequence of its intimate connection with the great vessels and nerves and its extension under the clavicle into the neck, it will be useless to proceed with the operation.

As precautions against recurrence the exposed surfaces may be sponged with a strong solution of chloride of zinc, or be seared with the hot iron; and the latter agent should always be employed if nodules have been cut out of the pectoral or intercostal muscles or the ribs.

While I am not unmindful of the fact that these radical measures must of necessity increase the mortality, I cannot avoid thinking that the end justifies the means. The older and more simple operation was probably fatal in about one case in fifteen, although I myself have lost only one patient out of fifty-five whom I subjected to partial procedures. Within the past seven months, however, I have adopted the principles which I have just enunciated, that is to say, I removed the mamma and its coverings bodily, dissected off the pectoral fascia, and cleaned out the axilla in five cases, and all recovered. In favor of the method it may be said that, as the wound is an open one, there is no danger of the retention of discharges and of the evil consequences which follow that accident. That the mortality is not excessive is shown by the statistics of adequate operations performed at the Bethany Hospital, of Berlin,

from 1873 to 1876, and analyzed by Dr. Stettegast;¹ and by the statements of Henry and Winiwarter. Thus, of 394 cases, 71, or 18·02 per cent., were fatal; and the mortality was two-thirds less when the axillary glands did not require removal. Thus, of 264 in which the breast was amputated bodily and the axilla was cleaned out, 61, or 23·10 per cent., died; while of 130, in which the breast alone was removed, 10, or 7·69 per cent., were fatal. These results are far more favorable than those obtained, for example, from the amputation of limbs for sarcoma of the bones or even of the soft parts; and yet the very surgeons who do not hesitate, and I speak from observation, to amputate for malignant disease, appear to be unwilling to incur a risk in the attempt to eradicate an affection which is so surely lethal as carcinoma of the mamma. The organ itself, even if it were sound, is no longer of any use, except perhaps for the preservation of a symmetrical figure, at the advanced age at which cancer develops, and on this ground there can be no objection to its removal. Conservatism in the use of the knife cannot, therefore, in the light of modern pathological investigations, and of the results obtained from adequate operations, which are based upon these researches, be too strongly condemned, as it not only deprives women of their only chance for a permanent recovery, but maintains the opprobrium which has for centuries adhered to operations for this class of affections.

For the disrepute into which operations have fallen surgeons are not alone responsible. Many patients are averse to the knife at the very time when

¹ *Langenbeck's Archiv*, Bd. xxiv, 1879, p. 625.

it holds forth the best prospects for success ; and not a few family attendants, who are consulted when the case is amenable to treatment, are in the habit of waiting for further manifestations before they seek surgical assistance. By such a course, which is in the highest degree reprehensible, not only is injustice done to all concerned, but many lives are sacrificed which might have been spared had the woman been seen when the malady was in its incipency. Hence physicians should know that a hard tumor of the mamma after the age of forty is most suspicious, since the chances are as thirteen to one in favor of its being of a carcinomatous nature ; and their doubts may give way to comparative certainty if there is a history of heredity, if the growth started from an induration consequent upon puerperal mastitis, or if there is an obstinate psoriasis or eczema of the nipple. Under these circumstances the surgeon should not hesitate to sacrifice the entire organ.

The probability of recurrence after thorough operations is so greatly diminished that local reproduction was witnessed in only 5 of the 51 patients who recovered permanently. In three there was one recurrence ; while, in one, there were two recurrences in a twelvemonth, and in one there were three reproductions in four years. In these two cases the subjects were perfectly well, respectively, for four and a half and for twelve years after the last operation ; so that, as in the case of sarcoma, recurrent tumors should be freely extirpated as fast as they appear.

There are of course certain cases in which the disease has advanced so far that operations are not justifiable. Thus, in chronic atrophying scirrhus, a

variety of carcinoma in which the surrounding tissues are always extensively infiltrated, and in which, moreover, the patient may live for many years in comparative comfort, the knife should be withheld: nor should the surgeon interfere when there are signs of visceral contamination; when the attachments involve the entire mammary region; when both breasts are extensively affected; when the skin of the opposite side contains nodules; or when the glands of the axilla are intimately connected with the vessels and nerves, as denoted by their immobility, by pain and tumefaction of the corresponding arm, and by œdema of the breast, and the more especially if the glands of the neck be simultaneously contaminated.

In speaking of removal I have made mention of no measures except the knife, simply because I believe that what cannot be reached by the scalpel cannot be reached by caustic applications. While the latter are so uncertain in their action that rapid recurrence may be anticipated, I do not think that they are to be entirely condemned; but I would restrict their employment to the allaying of fetor and the improvement of the surface of open cancers. In cases of this description Esmarch¹ employs a powder composed of arsenic acid and muriate of morphia, of each, 0·25, calomel 2·0, and powdered gum arabic 12·0, of which he sprinkles half a teaspoonful daily on the surface until a yellowish and leathery crust forms, which, on dropping off, leaves a clean granulating surface. He not only states that this application is safe, painless, and disinfecting, but illustrates its action by drawings of a case of medullary carcinoma in which

¹ *Langenbeck's Archiv*, Bd. xxii, p. 449.

its good effects are most striking. The paste of chloride of zinc, which is usually employed, is so excessively painful that its application cannot be recommended.

Although parenchymatous injections of acetic acid and other fluids, electropuncture, compression, and congelation have apparently retarded the progress of cancer, I am of the opinion that their employment is merely a waste of time.

When operative interference is inappropriate, all that can be done is to render life endurable by the relief of pain, the arrest of hemorrhage, and the correction of fetor.

To fulfil the first of these indications, if the suffering be great, the patient should be kept gently and continuously under the influence of opium or some of its preparations, hypodermic injections of morphia with a minute quantity of atropia being the most generally applicable. If the pain is increased by the active growth of the neoplasm, I know of nothing that mitigates it so rapidly as the local application of acetate of lead in the proportion of fifteen grains to the ounce of water. Under similar circumstances, or when the breast is hot, tense, tender, and perhaps throbbing, bags of ice afford great relief. When the active symptoms have subsided, these measures may give way to an application composed of a drachm each of the extract of belladonna and the extract of stramonium to the ounce of ointment of petroleum or cosmoline. Should the corresponding arm be œdematous and painful, it should be enveloped in a flannel roller and kept elevated on a pillow.

In the event of hemorrhage resisting cold and the

ordinary astringent applications, it may be checked by pressing a bit of hemostatic cotton, which is prepared by soaking absorbent cotton in Monsel's solution and permitting it to dry, directly upon the bleeding orifice. As a deodorizer five grains of chloral hydrate to the ounce of cosmoline, an application which also possesses the merit of assuaging pain, will be found most useful. When the tumor is sloughing it should be covered with an elm poultice medicated with balsam of Peru, or a weak solution of chloral, permanganate of potassa, chloralum, chlorinate of soda, girondin, or chloride of zinc. When the dead parts have separated, the ointment of chloral is my favorite remedy.

Under all circumstances the breast must be protected from friction, injurious compression, and the risk of blows, and changes of temperature. Hence the patient should be requested to lay aside her corset, and cover the organ with a piece of spongopiline, a rabbit skin, or a layer of cotton wool, confined by a roller or handkerchief. If the tumor be open, oiled silk or paper should be placed between the dressings and the outer coverings to ensure cleanliness.

With regard to general measures it need only be stated that the diet should be light, nutritious, and assimilable, and that the strength should be supported by tonics, of which the best are the tincture of the chloride of iron, tincture of nux vomica or strychnia, and quinine.

In the removal of the entire breast the anæsthetized patient should be placed recumbent, with the af-

fect side slightly elevated, and the arm held off at a right angle to the body. A large and stout scalpel is then thrust directly down through the skin and fat to the aponeurosis of the great pectoral muscle, and carried around the organ, so as to encircle it. If the mass be attached to the pectoral fascia, the latter structure should be dissected off with it, the assistants being on the alert to compress with their fingers, or with the small artery forceps of Nunneley, the orifices of divided vessels, which should be successively ligated when the amputation is completed. The next care of the surgeon should be to search for and remove any outlying lobules of the gland, his attention being especially directed toward the axillary border of the incision, where they are generally to be found. He should then examine carefully the muscles of the walls of the chest and the costal cartilages, and freely extirpate any nodules which may be situated in these structures, and afterward cauterize the wounds with the ordinary or with Paquelin's cautery. These points having been attended to, he should next carry his index finger along the lower prominent border of the pectoral muscle and penetrate the axilla, which he should thoroughly clean out if he discovers that any glands be enlarged. In executing this step of the operation, an incision is to be prolonged into that space through the skin and fascia, after which the knife is to be laid aside, and the diseased structures are to be removed with the fingers, assisted, if it be necessary, by closed scissors curved on the flat, or with periosteal elevators. The practice of drawing down the indurated and attached glands with a tenaculum or double hook renders the large vessels very liable to

injury, which exposes the patient to the dangers of hemorrhage and the entrance of air. Hence it is more prudent to trust to the fingers alone, without making traction on the axillary growth. Should any vessels be opened, they must be ligated forthwith. Care must be taken also to carry the fingers under the pectoral muscles, as diseased structures are not infrequently to be found in that locality. Conducted in this way, the operation is most simple, and I have more than once performed it without having to ligate a single vessel in the axillary space.

Hemorrhage having been restrained¹ and clots removed, the upper portion of the axillary wound is then brought together with a few interrupted sutures, and an oiled tent inserted into its lower angle, with the view of affording free drainage. The large wound resulting from the extirpation of the breast may be very materially diminished by dissecting the skin for several inches from its deep connections, and by inserting several sutures at a considerable distance from the edges, whereby they may be drawn nearer together.

The entire surface is then protected by an oiled compress confined by adhesive strips and a broad roller, through the latter of which the arm is also fixed to the chest. The patient is put to bed, and a suitable amount of morphia is thrown under the skin.

I have myself never resorted to antiseptic precautions in amputating the mammary gland. The wound being an open one, there are no dangers to be feared from decomposing retained secretions or clots of blood,

¹ The general oozing from the pectoral muscle can readily be arrested by cloths wrung out of hot water.

and the five patients that I subjected to the procedure all recovered under simple dressings. In the partial extirpations of the breast that I have practised, I have also restricted myself to the compress of oiled lint, and I have never had reason to regret the practice. Whether the antiseptic treatment has diminished the mortality of the operations upon the mammary gland, it is impossible to say from any very extended experience, although the observations of Oldekop on this point are not in its favor. Thus of 184 operations there were 16 deaths, or in the ratio of 8·7 per cent., under ordinary dressings; while, of 77 conducted upon the antiseptic principle, 7, or 9·1 per cent., were fatal.

The dressings should not, unless the weather be warm, be removed before the expiration of three days, when an elm poultice may be substituted for the oiled lint, and the tent be removed from the axilla, the wound being kept open subsequently by the daily insertion and expansion of the blades of the dressing-forceps. The sutures should be permitted to remain as long as they are doing good. With the view of promoting the granulating process, when cicatrization is well established the surface may be touched daily with a weak solution of nitrate of silver; or healing may be expedited, when the wound is very large, by epidemic grafting.

For the removal of the innocent small neoplasms, it suffices to grasp them between the fingers of one hand, lay open their capsule, and enucleate them with the handle of the scalpel or with the index finger. When the skin is ulcerated, it should be included between two curvilinear incisions; and under

all circumstances the nipple should, if possible, be spared, and the incision be carried in a line radiating from it toward the periphery of the gland. If the growth be small, union by the first intention should be aimed at by accurate apposition of the edges of the wound and the application of a compress. If, on the other hand, the wound be a large one, a tent should be inserted into its most dependent portion, or at its lower angle, with the view to proper drainage, since, if primary union throughout be attempted, experience shows that erysipelas, septicæmia, and pyæmia are of not infrequent occurrence.

The treatment of cysts does not differ from that of similar formations in other organs. Birkett¹ states that he has cured eighteen cases of cysts with serous contents by simple puncture and by an embrocation consisting of hydrochlorate of ammonia, alcohol, and camphor mixture. Injection of iodine or other irritating fluids, or the insertion of a delicate seton, sometimes answers a good purpose; but the only measures worthy of confidence in the management of small cysts are their extirpation, or laying them open and packing them with lint to excite their obliteration by granulations. When large and solitary, their contents may be let out, a drainage-tube be inserted, and gentle compression be applied to favor their contraction and obliteration. Hydatid cysts demand free incision and dressing from the bottom; while multiple cysts require removal of the entire gland, a sufficiency of integuments being preserved to admit of accurate closure of the wound.

¹ *Holmce's System of Surgery*, 2d ed., vol. v, p. 266.

CHAPTER XIII.

TUMORS OF THE MALE MAMMARY GLAND.

THE mamma of the male is liable to the same neoplastic and cystic formations as are met with in the female; but they are, for obvious reasons, very uncommon.

Of the neoplasms derived from the connective tissue framework of the organ, Virchow describes a fibroma;¹ while Croft,² Duplay,³ and Bourdillat⁴ have recorded examples of spindle-celled sarcoma; and I myself have examined a section of a recurrent growth of that nature removed by Dr. Dawson, of Cincinnati. Duplay,⁵ moreover, refers to a case of round-celled sarcoma in which the patient was free from recurrence six years after operation.

Of those originating in the glandular structure, Obolensky⁶ met with a myxomatous adenoma, and Wagstaffe⁷ and Horteloup⁸ have tabulated, respectively, sixty-one and seventy examples of carcinoma; but they have included in their tables several instances of sarcoma. Chenet⁹ and Marciano¹⁰ have de-

¹ *Op. cit.*, t. i, p. 329.

² *Trans. Path. Soc. London*, vol. xxvii, p. 249.

³ *Op. cit.*, t. v, p. 664.

⁴ *Bull. de la Soc. Anat.*, ser. 2, t. xi, p. 94.

⁵ *Op. cit.*, t. v, p. 664.

⁶ *Virchow-Hirsch's Jahresbericht*, Bd. i, p. 305.

⁷ *Trans. Path. Soc. London*, vol. xxvii, p. 234.

⁸ *Tumeurs du Sein chez l'Homme*, Thèse de Paris, 1872.

⁹ *Virchow-Hirsch's Jahresbericht*, Bd. ii, 1877, p. 401.

¹⁰ *Bull. de la Soc. Anat.*, t. xlix, p. 921.

scribed cases of melanotic carcinoma; Lannelongue¹ and Doutrelepont² have observed disseminated scirrhous; Cooke³ describes an atrophying carcinoma; and Ollier⁴ has met with the cuirass form of the affection. Cruveilhier, Vidal, Bérard, Larrey, Blandin, and Desguise have described encephaloid carcinoma; but, in the absence of careful minute examination, their true nature is questionable.

Sir James Paget⁵ believes that of every 100 cases of scirrhous carcinoma of the mamma only 2 occur in men. Of 102 examples of which I have a record, I have seen only 2 in males,⁶ from one of which fig. 16 was taken. Billroth⁷ out of 252 cases had 7; and Henry⁸ out of 196 examples saw 4 in men; so that the proportion is as 1 to 42.

Of the cystic formations Velpeau⁹ describes one containing milk; while he met with three ordinary retention cysts,¹⁰ of which examples are also recorded by Gowlland,¹¹ Hoffmann,¹² Roux,¹³ Broca,¹⁴ and Anger.¹⁵

As the development, history, diagnosis, and treatment of tumors of the male mammary gland do not present peculiar features, their further consideration need not detain us.

¹ Horteloup, *op. cit.*, p. 80.

² *Revue des Sciences Médicales de Hayem*, 1874, p. 265.

³ London *Lancet*, vol. ii, 1859, p. 462.

⁴ Horteloup, *op. cit.*, p. 82.

⁵ *Op. cit.*, p. 634.

⁶ *Phila. Med. Times*, July 5, 1879, p. 484.

⁷ *Chir. Klinik*, Wien, 1871-'76, p. 269.

⁸ *Op. cit.*, p. 121.

⁹ Horteloup, *op. cit.*, p. 49.

¹⁰ *Ibid.*

¹¹ London *Lancet*, vol. ii, 1861, p. 498.

¹² Klebs, *op. cit.*, p. 1199.

¹³ Horteloup, *op. cit.*, p. 50.

¹⁴ *Ibid.*, p. 51.

¹⁵ *Ibid.*, p. 51.

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